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# Coastwatch

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## After the Storm

*I N C L U D I N G*

Smooth Canoeing

*P L U S*

Oysterville

*A L S O*

The Rich Lands



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The North Carolina Sea Grant College Program is a federal/state program that promotes the wise use of our coastal and marine resources through research, extension and education. It joined the National Sea Grant College Network in 1970 as an institutional program. Six years later, it was designated a Sea Grant College. Today, North Carolina Sea Grant supports several research projects, a 12-member extension program and a communications staff. Ron Hodson is interim director. The program is funded by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration and the state through the University of North Carolina.

*Coastwatch* (ISSN 1068-784X) is published bimonthly, six times a year, for \$15 by the North Carolina Sea Grant College Program, Box 8605, N.C. State University, Raleigh, NC 27695-8605. Telephone: 919/515-2454. Fax: 919/515-7095. E-mail: [k\\_hart@ncsu.edu](mailto:k_hart@ncsu.edu). World Wide Web address: [http://www2.ncsu.edu/ncsu/CIL/sea\\_grant/index.html](http://www2.ncsu.edu/ncsu/CIL/sea_grant/index.html). Second-Class Postage paid at Raleigh, N.C.

**POSTMASTER:** Send address changes to *Coastwatch*, North Carolina Sea Grant, Box 8605, N.C. State University, Raleigh, NC 27695-8605.

*Front cover photo of Hurricane Fran damage by Spencer Rogers.*

*Inside front cover photo of a stark winter scene in coastal North Carolina by Robert N. Elliott.*

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Six months after Hurricane Fran, researchers are still determining the short- and long-term effects of this devastating storm on the southern barrier islands and the homes and buildings that stood in its path. *Coastwatch* staffer Kathy Hart talks with coastal geologists and Sea Grant's Spencer Rogers, a coastal erosion and construction specialist, for their assessment of the storm's effects. .... 2

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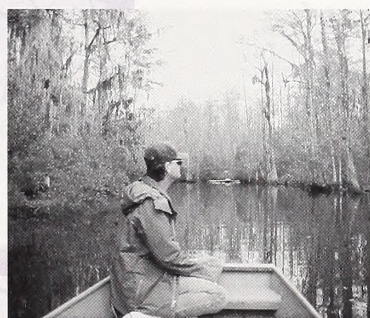
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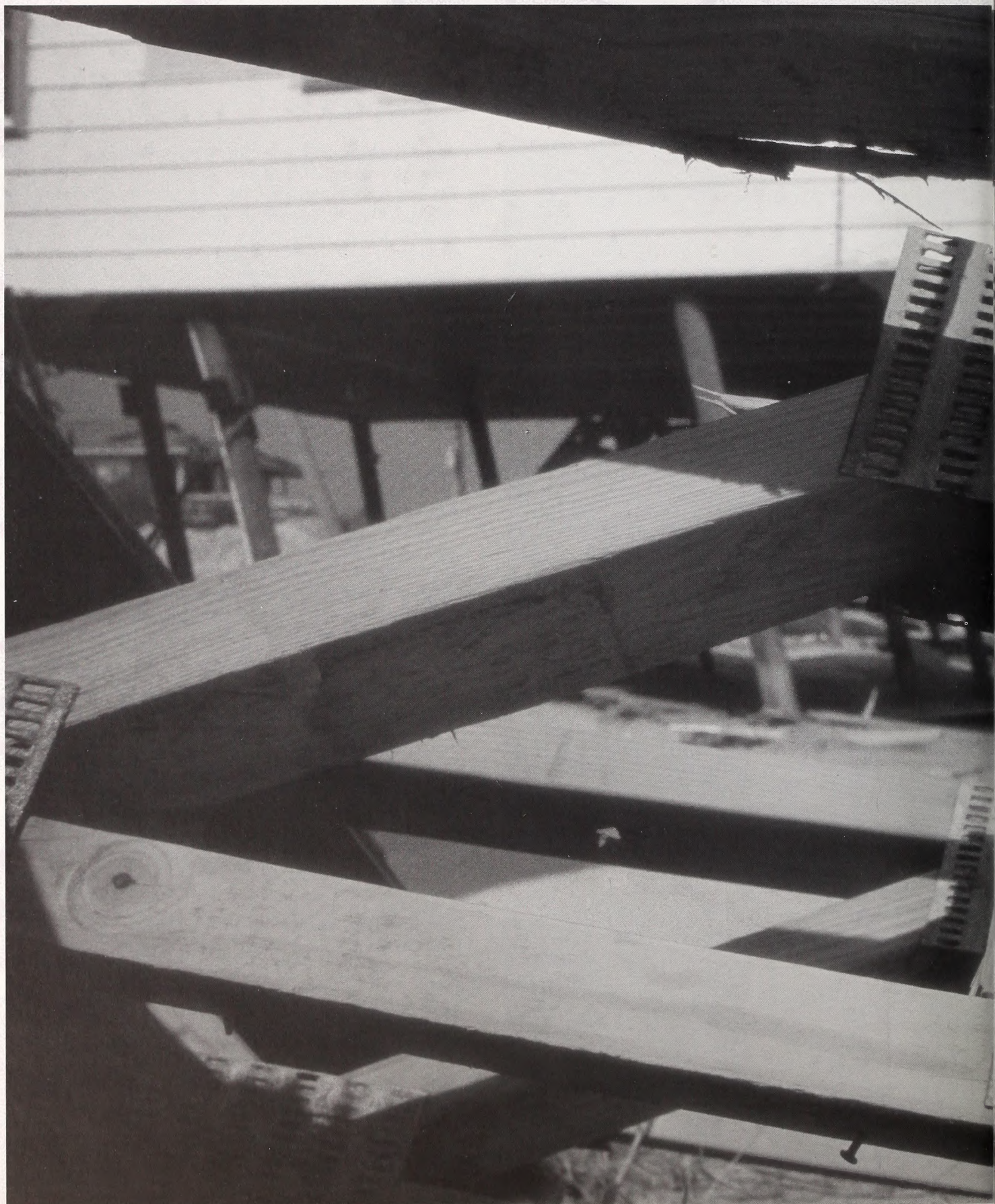
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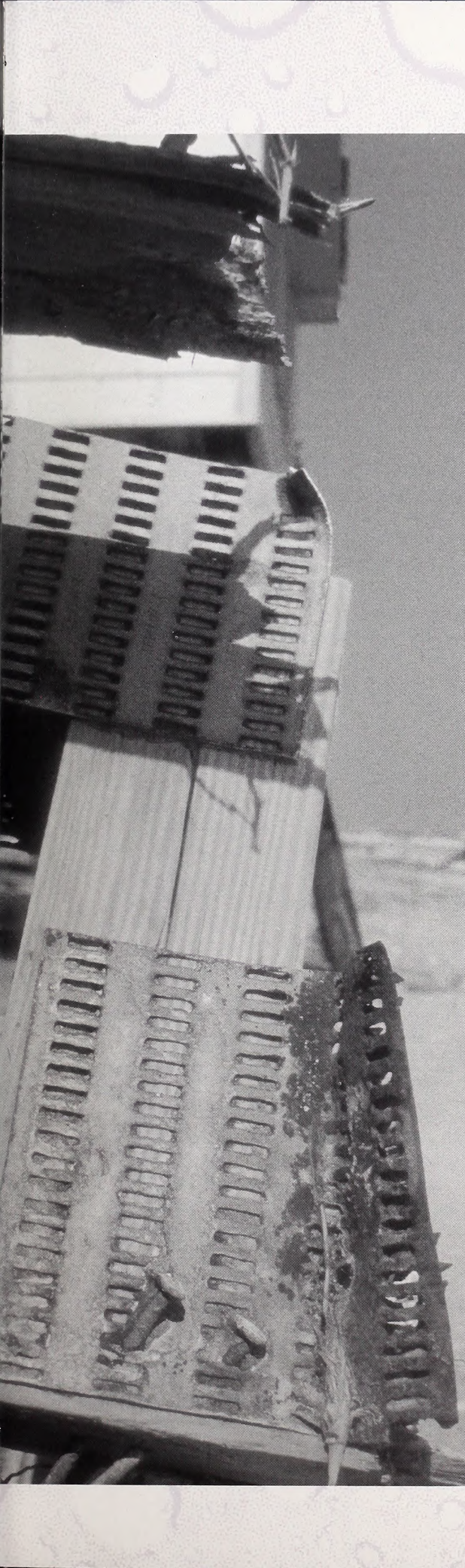
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# After the Storm

## How Hurricanes Reshape Beaches and Building Standards

*By Kathy Hart • Photographs by Spencer Rogers*

Six months ago, Hurricane Fran slammed ashore along North Carolina's southern coast. The tropical storm hurled high-velocity winds, pounding waves and floodwaters head-on at barrier islands that hadn't looked a powerful hurricane in the eye in more than 30 years.

The immediate result was devastating: buildings destroyed or damaged; roadways washed away or buried by sand; electrical, phone and municipal services disrupted; miles of beach sand and dunes sucked from the shoreline; and scores of items, from boats to family photo albums, swept away never to be seen again.

The toll of Fran's fury was high: millions upon millions of dollars in damage and emotional scars that will last a lifetime. After a 30-year reprieve, the people of coastal and eastern North Carolina were given a firsthand lesson — one with a lasting impression — in hurricane dynamics.

But what were the subtler messages delivered by Fran? As researchers assess the aftermath and recovery, they're taking a hard look at hurricane impacts on the Tar Heel coast.

## Hurricanes and Coastal Geology

To the average vacationer or even full-time coastal resident, a beach is a beach. Its gritty sands slope from the base of the dune to the edge of the surf. In the summer, the slope is gentler and the beach wider. Winter storms mold a steeper, more narrow beach face. The dunes, topped with creeping vines and waving grasses, stand as tall stalwarts of the beach.

It's all a pretty picture. But there's more to a beach than meets the eye.

Geologists Stan Riggs of East Carolina University, Bill Cleary of the University of North Carolina at Wilmington and Steve Snyder of N.C. State University say beach

*Continued*





dynamics are a complicated puzzle of interacting elements — winds, waves, currents, sand and geologic formations. The way these elements fit together determines how a beach responds during a hurricane as well as how it recovers after the storm has passed.

Sand constantly moves along the shore. Waves deliver sand and take it away. During fair weather, waves pick up offshore sand and carry it to the beach via low-intensity waves. That's why the beach is wider in the summer. During storms, high-intensity waves eat away the sand, carrying it offshore.

Along North Carolina's coast, more sand is taken than returned, so Tar Heel beaches experience an average erosion rate of 2 to 3 feet per year. Some areas lose less sand; others lose more.

Sand is also transported along the surf zone via longshore currents. These currents move parallel to the shoreline and carry suspended sand churned by wave action back and forth along the beach.

Wind transports fine grains of dry beach sand above the waterline. If halted by vegetation, sand fences or other obstructions, these grains pile up to build dunes.

Dunes act as reservoirs of sand that help to ward off waves and surges during hurricanes and other major storms, but they're not much help against the more gradual process of erosion, says Spencer Rogers, Sea Grant's coastal erosion and construction specialist.

When it comes to storms, the more sand between you and the ocean, the better, Rogers says. But for some beaches, sand is in short supply. That's the case along many southern coastal beaches, including Topsail, Kure and south Onslow beaches.

In fact, geologists say North Carolina beaches are sand-starved. Coastal rivers deliver little, if any, sand and sediment to the shoreline.

The sand that does coat our beaches has come from the gradual erosion of rocks and sediments along the inner continental shelf during the last several thousand years of sea level rise. But with little input of new sand, the system simply continues to shuffle the same sand back and forth between the beach and the nearshore continental shelf.

When high-energy storms move ashore, their waves can quickly scour away the thin coating of beach sand, moving on to gnaw at the dunes. Often, the rock or mud base of the beach is exposed during and immediately after the storm.

This year, North Carolina's southern beaches got a one-two punch with two hurricanes slamming ashore in as many months. In July, Bertha came calling, eating away the berm and taking a bite out of the dunes. Large quantities of sand were moved offshore. In the aftermath, the gentle summer waves were restoring sand to the beach just as the bigger, more powerful Fran whirled in.

With less sand on the beach, the storm waves and surge



quickly swept away the dunes and, in many cases, overwashed segments of the barrier islands from Bogue Banks to Kure Beach. In places, 20 to 30 feet of beachfront were washed away.

Most of the sand sucked from the beaches was deposited offshore. But waves did push some sand landward, depositing it in low-lying areas behind the dunes. Now, the multibillion dollar question in terms of tourism and coastal development becomes, "How much of the sand will be restored naturally?"

It depends on the type of beach, say Riggs, Cleary and Snyder.

In some areas, the beach will recover entirely, but gradually, during the next 10 to 15 years.

The impact may be very different for rock and mud/peat-based beaches — a description that fits much of the shoreline from south Onslow to Kure beaches. Along these shores, some of the sand will return during the next decade. But Riggs, Cleary and Snyder ultimately anticipate a net loss of the gritty stuff and a beach face that lies 10 or more feet landward of its former location.

Once the sand is drawn offshore, Riggs explains, it becomes trapped behind natural reefs called hardbottoms that often lie just feet beyond the surf zone. Some of these reefs, which resemble underwater mesas, rise 6 to 15 feet off the ocean floor. Sand falls in the valleys or canyons between the reefs, where waves can't move it shoreward.

With less sand available, the shoreline recedes.

Of those areas in Hurricane Fran's strike zone, Wrightsville and Carolina beaches fared best, say Cleary and Rogers. Both had been nourished with thousands of tons of sand, making the point that more is better when it comes to sand and storm protection. Wrightsville and Carolina beaches experienced far fewer breeches of the dunes, much less overwash and little structural building damage due to the storm surge, Rogers says.

But beach nourishment doesn't come without heavy costs — \$1 million to \$10 million per mile of sand replenishment. These are dollars not all beach communities can afford, especially considering that their investment may wash away with the next big storm. Questions about who benefits and who pays for these costly expenditures also arise.

And while shortcuts may seem cheaper, they don't pay off. Bulldozing sand already on the beach into a tall dune just beyond the high tidemark doesn't constitute a beach nourishment project, Rogers says.

"Beach bulldozing doesn't do anything but help the property owners' sense of well-being," Rogers says. "They see more sand, but there's not more there, and beach communities are often wasting substantial dollars that could be spent on more effective efforts."

Beach nourishment adds new sand to the system with dunes built as far landward as possible.



*Continued*





## It's All in How It Was Built

Rogers is an old hand at assessing building damage from hurricanes. He's surveyed the structural damage from every hurricane that has struck the East and Gulf coasts during the last 21 years.

Fran, however, was the first big strike close to home. Sure, there were Diana, Emily and Bertha, but wind and wave conditions during these storms were light in comparison. Fran was a hurricane of a different category, packing winds, waves and a storm surge like the Tar Heel coast hadn't seen since the 1950s.

Wind gusts were clocked between 110 and 120 mph on the beach during the height of Fran's fury. But North Carolina's building code requires that barrier island structures withstand winds of 130 to 140 mph. Consequently, wind did not directly damage many buildings during Fran, especially those constructed in the last 20 years, Rogers says. However, trees felled by the strong winds did cause damage to buildings.

The most destructive force came in the storm surge. Along some areas of the southern barrier islands, the surge reached more than 12 feet above sea level — a height at or above the 100-year flood level.

The surge is also a key factor in erosion, which is affected by the duration of the storm. Fran's arrival on the heels of Bertha caused erosion at a level that occurs only once every hundred years.

"The worst building damage was caused by water levels, wave action and erosion," Rogers says.

Damage also depended on topography.

"If buildings were behind dunes big enough to prevent overwash and were properly elevated on pilings, then they fared better," Rogers says. "That's what happened at Wrightsville and Carolina beaches. The first-row (beachfront) houses took the brunt of the storm."

In areas with low dunes, the waves and surge knocked out the sandy humps and washed over the island. The hurricane deposited 2 to 3 feet of sand inland, and second- and third-row houses sustained considerable damage. The degree of damage in these areas depended on the elevation of the structure and depth of the foundation, Rogers says.

And in most cases, those structural elements were contingent upon when the building was constructed. Houses built before the 1960s fared the worst. Their foundations were often at or only slightly above ground level.

"On the beachfront, these houses were completely destroyed," Rogers says. "And even as far back as the fourth or fifth row, these houses had significant damage."

After the hurricanes of the 1950s, the N.C. Building Code Council adopted hurricane-resistant construction standards for barrier island buildings. Beginning in the



## Forecasting the Surge

By Kathy Hart

In the hours before Hurricane Fran landed, Lian Xie sat at his computer at N.C. State University, his fingers flying over the keys as he entered the latest storm information from the National Weather Service into a complicated computer model.

After 30 minutes of data entry, Xie typed in a command sequence that started his computer thinking, meshing storm statistics with information about the topography of coastal North Carolina.

The result was a colorful visual representation of likely flood levels on a computer-generated map of Albemarle and Pamlico sounds.

It didn't look good. Much of the southern Albemarle peninsula was cloaked in yellow, orange and red, representing flood and storm surge heights of 6 to 9 feet.

With a few more keystrokes, Xie, a researcher in NCSU's Department of Marine, Earth and Atmospheric Sciences, retrieved a time-lapsed, visual sequence of eastern North Carolina flood levels for two-hour intervals during the next 12 hours. The time-lapsed sequence was based on the hurricane's projected path.

As soon as the information was available, Xie picked up the phone to dial the National Weather Service, conveniently located on NCSU's Centennial Campus. The meteorologists used the information to issue flood warnings for coastal North Carolina. (With the cost of evacuation estimated at \$1 million per mile, forecasters like to be as accurate as possible when they

relay information to the state and local officials who make evacuation decisions.)

As hurricanes can be, Fran was fickle, and initial data from the National Hurricane Center did not forecast a direct hit for North Carolina's coast. Not to be caught unprepared, Xie ran the model based on a direct hit. When it became apparent Fran was barreling into the Tar Heel coast, Xie had his predictions ready.

The model, which was partially developed with North Carolina Sea Grant funding, is only as good as the data Xie receives from the National Weather Service. That's why Xie often runs the model for a worst-case scenario.

And for the most part, his model passed the test with remarkable accuracy. The model predicted an 8-foot storm surge in New Bern. The surge was 9 feet.

Although Xie's model only predicts soundside flooding, other models developed at Princeton University and by the National Hurricane Center forecast oceanside surges. Xie is developing a new computer model that will integrate ocean, sound and coastal river surge and flood predictions. He hopes it will be operational before the next hurricane strikes.

Meanwhile, meteorologists at the National Weather Center and officials at the state Division of Emergency Management are happy to have the information Xie can generate now. The predictions make their jobs easier and their forecasts more accurate, possibly saving the lives of coastal residents. ☐

1960s, the code required that all buildings use stronger connectors, such as metal straps securing the roof to the walls, to resist wind damage and that they be raised on pilings. Buildings were required to be elevated above the historical high watermark, but in most cases, contractors boosted them even higher to allow underhouse parking and storage.

In erosion-prone areas, it was also necessary to sink the pilings 8 feet into the ground to keep the building stable and prevent damage if storm waters scoured away sand.

"These building code regulations changed the public's perception of what a beach house looks like in North Carolina," Rogers says. "It came to be expected that all beach houses be elevated on pilings with underhouse parking. That's what people think of when we say beach house now."

For the most part, houses built to meet these code requirements fared well if they weren't beachfront or second-row structures, Rogers says.

On the oceanfront, pilings sunk 8 feet into the sand weren't deep enough. The waves swept the sand from under these houses, leaving no support for the pilings. Houses toppled off their foundations, disintegrating in the waves or knocking into other homes as they floated landward.

In 1986, on Roger's advice, the N.C. Building Code Council enacted new rules for erosion-prone areas that required pilings be sunk 5 feet below sea level or 16 feet below ground level.

Most of the houses built since then, including those on the oceanfront, sustained the least damage in Hurricane Fran.

"There was an overwhelming reduction in the level of damage in these houses, Rogers says.

"We're not so overconfident to think that we have all the answers regarding hurricane-resistant construction," he says. "We're still looking in detail at how buildings fared. But I'm certainly pleased that newer buildings performed so much better, and I think we are much closer to building hurricane-resistant houses on the coast than ever before." ☐



# Blazing Trails:

## Explore the Coastal Plain by Canoe

*By Daun Daemon*

A collage of landscapes awaits visitors to the eastern part of North Carolina — otherworldly swamplands draped with veils of Spanish moss, heady forests of arrow-straight pines, stands of majestic hardwoods thick with wild creatures, expanses of flatlands domed by a brilliant blue sky. A good way to view this scenery is to glide peacefully down one of the area's many rivers or creeks in a canoe.

A water trail system in the state's 10 northeastern counties now makes that pursuit easier. Initiated in 1992 by the Albemarle Resource Conservation and Development Council (ARC&DC), the Albemarle Region Canoe Trails system encompasses 29 waterways that meander through 200 miles of countryside.

Rodney Johnson, executive director of ARC&DC, dreamed up the plan when he came across a project for developing a trail on the Perquimans River. Expanding the plan to cover the entire region seemed the sensible course to take.

*Continued*







Rodney Johnson

*Warwick Creek in Chowan County*



Johnson contacted Tom Potter, eastern North Carolina's regional trails specialist with the N.C. Division of Parks and Recreation, for technical help, and the two set to work. Their plan was to plot a number of trails in smaller, more protected bodies of water that were easily accessible.

Though most of the streams in the system are just down the road for many eastern North Carolinians, they have generally been overlooked by residents when they plan outings, Potter says. One aim of the project is encouraging locals to take advantage of the nearby opportunities to appreciate the state's natural wealth.

Escaping the stresses of the modern world is an added benefit for a canoeist on these trails.

Says Potter, "Traveling these streams slows down the pace of life. You're not bothered by televisions, telephones or other interruptions. It's one of the quickest ways to get out in nature for people in this part of the state. You're isolated but not too far from everyday life."

It seems that some people have gotten that message already. Johnson is quick to point out that canoeing has become a more popular sport here in the past few years. Every day, he spots canoes on top of vehicles. Just five years ago, he says, that was a rare sight in eastern North Carolina.

According to Paul Cook, a spokesperson for the N.C. Division of Travel and Tourism, the trail system will also benefit the state's tourism trade. Many of the top 20 attractions in North Carolina are outdoor areas such as state parks.

"Obviously, a lot of people come here to enjoy the great natural beauty and outdoor activities North Carolina has to offer," Cook says. "Having specific trails is an advantage because they offer another selling point."

Many canoe and kayak enthusiasts may already know about particularly good but obscure waterways to travel here, but other folks visiting the Tar Heel state are not so fortunate. A

clearly defined and well-advertised trail system may encourage more visitors to explore these areas.

"That knowledge becomes a tool for us and for the state's travel industry," says Cook. "We have hundreds of people calling every week for that kind of information — from North Carolina residents to people from out of state to international visitors."

Boosting tourism is an important goal of the project, Johnson says.

"The metropolitan areas within several hours' drive from eastern North Carolina hold millions of people, and many are eager to get out of those places for a little while," Johnson says. "This made the project feasible from the very beginning."

About 2.5 million people live within a two-hour drive of the area and about 20 million within a six-hour drive.

To some natives, those numbers might sound daunting and raise concerns that inviting so many visitors to eastern North Carolina's watercourses is also inviting trouble. Johnson understands the fears for private property and the environment but says that the number of users at any one time will be small and the people who come will treat the trails with respect.

Another potential conflict is that between slower-moving canoeists and speedier motorboaters. Johnson and Potter anticipated this when laying out the system and sited most of the courses in the upper ends of streams where motorboats cannot run full throttle.

Establishing a trail system that takes advantage of the area's natural beauty while avoiding clashes among users and property owners is no small — or speedy — task. To begin, Potter and Johnson examined topographical maps and identified "canoeable" streams. They then undertook a yearlong physical assessment of the waterways by canoeing all of the targeted streams themselves.

Their next task was to plot a sign system. They decided to mark the streams at least once every mile so that canoeists will be assured they are on the right path. Directional arrows positioned at potentially confusing places like oxbows will help them know which way to go to stay on the trail.

Potter and Johnson then spent about a year and a half locating access points. They figured that access should be available every eight to 10 miles — the equivalent of about six to eight hours of canoeing time — so that folks can plan day trips and get off the water with little trouble. To follow through on this effort, the two identified the landowners of good access sites and got their cooperation. Many of the access points are Wildlife Resources Commission boat ramps, city and county recreational park ramps, private marinas and community ramps at bridge crossings.

After about two and a half years of hard work drawing up the trail system's details, Potter and Johnson still had what could have been two difficult pursuits ahead of them: convincing the county commissioners to give the streams official trails designations and then obtaining the funds to complete the project. Fortunately, neither was an obstacle.

For example, North Carolina Adopt-A-Trail provided \$5,000 for the signs necessary to mark the streams and access points. Once the signs were printed, volunteers and county staffers spent about half a year positioning them.

The final concern for Potter and Johnson was getting the word out. A regional brochure with a map and brief descriptions of each trail was printed, and individual county brochures with more detailed information will be ready by summer.

To make the trails even friendlier for vacationers, Potter next plans to add some raised camping platforms so that canoeists can spend the night in swampy areas where there are no high banks or dry land.





Rodney Johnson

### *Canoeists paddle the Little River*

"Canoeists can easily spend two weeks on the trails, but they don't have many places to camp," Potter says. "Of course, they can stay in hotels and bed-and-breakfast inns — that's great for the local economies, and we encourage it — but they should also have the option to stay on the rivers."

Even more ambitious is Potter's goal of a trail system for the eastern third of the state. He says that agencies and individuals below the Albemarle region have expressed an interest in the same opportunities now available in the northeastern part of the state.

"I want to do the same thing for the whole Coastal Plain — it's in the planning stages. Hopefully the system will be completed in the next couple of years," Potter says. "I can very easily see 800 to 1,000 miles or even more that could be signed."

Included in those plans are trails along the Neuse River and areas in the southeastern part of the state as well as many other waterways.

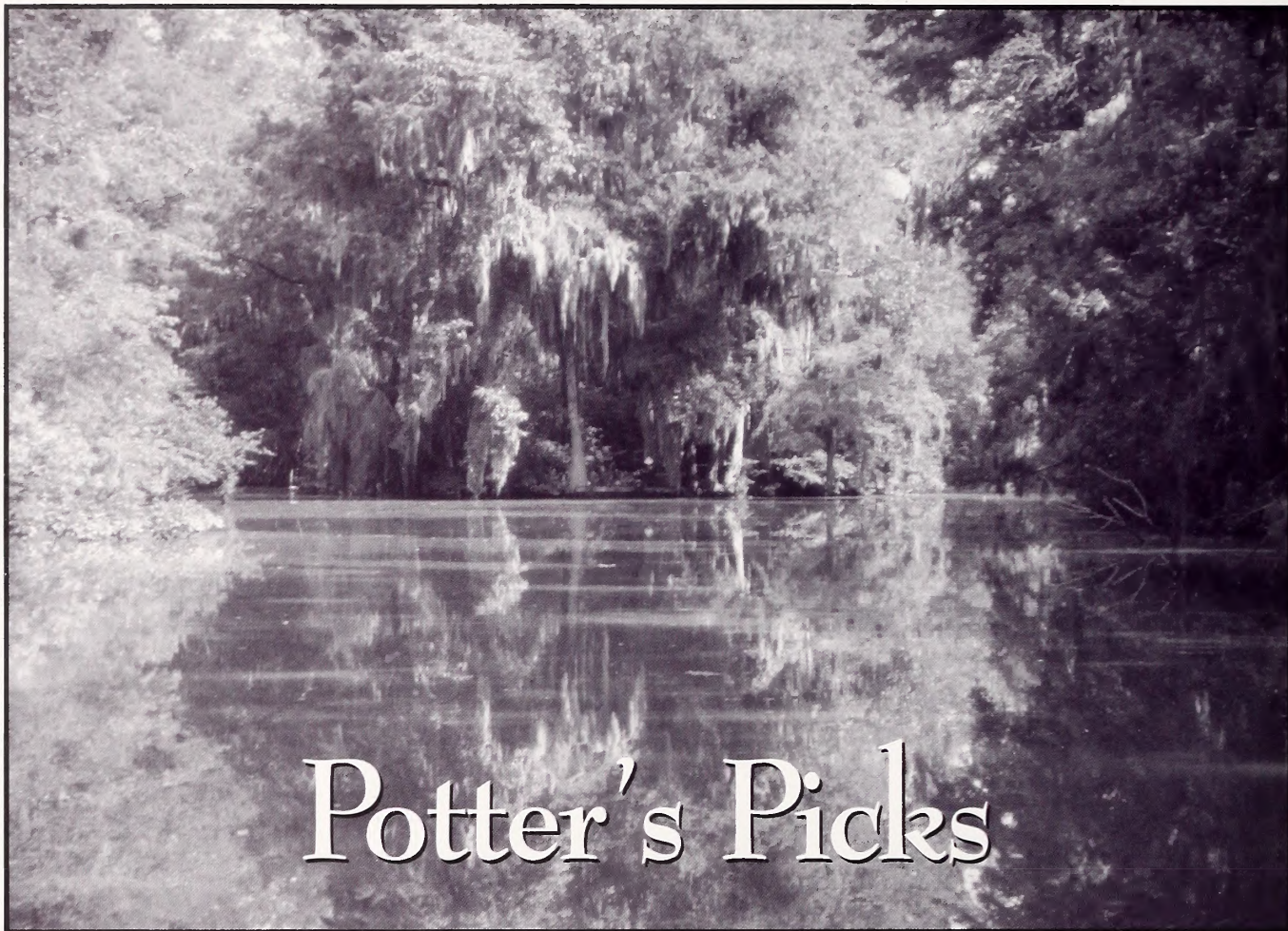
Though both the Albemarle trail system and the more extensive proposed system can be used by kayakers as well as canoeists, Potter

also plans to develop kayak trails in the open waters of sounds and larger rivers and on the inland side of the Outer Banks. He's currently seeking experienced kayakers to offer advice and ideas for planning these trails.

So far, interest in the Albemarle region trails has been encouraging. Potter has fielded calls from curious canoeists up and down the East Coast.

For more information about the trail system or a copy of the regional brochure, contact Potter at 919/778-9488 or Johnson at 919/482-7437. ■





Tom Potter

# Potter's Picks

*Conaby Creek in Washington County*

Whether your interest is in photographing scenery, viewing wildlife, testing your canoeing skills, sightseeing or just getting away from hectic city life, the Albemarle Region Canoe Trails system will have a trail to suit you. Below, Tom Potter recommends specific trails and ways to enjoy them. — Dawn Daemon

## Scenic Trails

- *Merchants Millpond* — On this trail, you'll paddle through a forest of buttressed cypress trees draped with Spanish moss and past beaver lodges dotted around the pond. Merchants Millpond State Park offers canoe rentals, family campsites and canoe-in primitive campsites on a first-come,

first-served basis. Camping facilities for organizations are available but must be reserved.

- *Catherine/Warwick Creek* — Starting in the narrows of the creek, this trail takes you downstream through scenic hardwood swamps to the Chowan River. The stream widens as it approaches the river and is dotted with islands of buttressed, stemmed cypress trees brimming with Spanish moss.

- *Northwest and Southwest Forks* — Particularly scenic because of their unusual setting, these trails pass through a pocosin environment. The two streams reach a depth of 30 feet in the main channels, which pass through groves of hardwood and pine trees and past beds of native reeds. You can

paddle upstream to where the stream is only a small drainage area for the surrounding forest.

- *Rockyhock Creek and Bennett Millpond* — Another trail that begins on an old milldam, Bennett Millpond offers a day of canoeing through cypress trees and past beaver lodges. You'll see nutria swimming in the water and sunning on tree stumps and tussocks of grass. The millpond is managed by the Albemarle Recreation Center, which has developed a hiking trail with several hundred feet of boardwalk. This facility offers the additional opportunity to try your land legs by exploring the adjoining woodlands. Future plans include a bridge over the dam where the millhouse was located to allow access across the millpond. At the old mill site, you can



portage around the dam and follow Rockyhock Creek to the Chowan River. The creek is lined with a canopy of mature trees as well as views of neighboring farmland.

## Wildlife Viewing Trails

- *Upper Little River* — This trail provides a half-day outing from the river's headwaters to the Wildlife Resources Commission's boat ramp on Hall's Creek. The trail can be traveled as a loop since the flow is usually very slow and will give you the opportunity to return to the access without much effort. The river is a haven for wood ducks, neotropical songbirds and other wildlife species. If you paddle quietly, you might glimpse a white-tailed deer.

- *Upper and Lower Milltail Creek* — These streams are located within the Alligator River National Wildlife Refuge, and you will probably spot birds that call the refuge home or that stop by during their migration. These trails also pass through a variety of plant communities, varying from typical marsh habitats to hardwood and pine forests. Located at the access near the old community of Buffalo City is the Sandy Ridge hiking trail, which enters the woodlands on the refuge.

- *South Lake Trail* — Located on the Alligator National Wildlife Refuge, this trail follows the edges of a protected estuary with many small creeks and coves to explore. Because of a healthy fish population, you'll have a good opportunity to spot osprey or other fish-eating birds feeding. Surrounded by a pristine environment, you can quickly remove yourself from any signs of civilization.

- *Lower and Upper Scuppernong River Trails* — These trails begin at the Columbia visitor's center, which is managed by the Partnership for the

Sounds. Near the beginning of the trails, the adjacent lands fall within the Pocosin Lakes National Wildlife Refuge and are inhabited by native wildlife as well as migratory birds. Since the riverbanks are largely undeveloped, you may see black bear or white-tailed deer swimming across the river. The two trails total 17 miles and can test the ability of even experienced canoeists. The trail can be traveled in segments, and the adjoining Riders and Second creeks allow you to experience smaller waterways and shorter outings.

- *Lake Phelps Trail* — The edge of Lake Phelps, located at Pettigrew State Park, is dotted with cypress trees and provides an opportunity to see a variety of birds and animals that make their home there. The lake is a popular fishing hole, so you can test your fishing skills and perhaps catch supper. While on Lake Phelps, pay particular attention to the weather conditions because the lake can quickly develop large waves if storms pass over. Consider camping at Pettigrew State Park and visiting the adjacent Somerset Place State Historic Site. Another bonus is the park's hiking and biking trails, including one that passes by several state champion trees.

- *Lake Mattamuskeet Trail* — While on this trail, located in the Lake Mattamuskeet National Wildlife Refuge, you will see a variety of birds and mammals. The trail follows the rim canal and then traverses sections of the lake dotted with cypress trees. Some of the trees contain osprey nests. During the migratory season, a variety of waterfowl visits the lake, and because the main purpose of the refuge is to shelter migrating birds, it is closed to boats and canoes from November to March. During this time, you can explore the old pumping station and the hiking and automobile trails.

- *Tull Creek* — You'll set out near the mouth of Tull Creek and canoe upstream through almost still water, passing thickets of pine trees and marshes. Residential development reaches to the banks of the trail, but the expanses of woodland offer a chance to view a variety of animals, birds and plants.

## Historic Settings

- *Pembroke and Queen Anne Creeks* — These trails carry you along Edenton's historic waterfront and offer views of the historic homes, buildings and relics of times gone by, such as old fish houses and piers. Pembroke Creek is somewhat developed and is used during warm weather for waterskiing by locals, so exercise caution during this time. The banks are lined with mature trees, many dripping with Spanish moss. The section of the trail along the Edenton waterfront is part of the Albemarle Sound, and the water can become quite rough on windy or stormy days. A walking tour of Edenton's many historic homes and buildings can be combined with a canoe trip to make a pleasurable journey into North Carolina's past.

- *Mackeys/Kendrick Creek* — This trail begins at the old fishing village of Mackeys near the Albemarle Sound, where several old fish houses are in view. It has stretches of high banks that provide habitat for many upland hardwood species usually not seen along coastal streams.

## Short Outings

- *Dillard Creek* — Beginning at the old milldam, you'll travel this short, scenic trail in a morning or afternoon and pass through stands of mature trees bordering both banks. The mouth of the creek becomes wide as it dumps its murky, acidic waters into the Chowan River.

*Continued*



Typical of the area, the creek's mouth is dotted with solitary cypress trees. Located at the milldam is the old mill, which has been converted to electricity, but you can purchase cornmeal ground by the old stones of the mill if you are lucky enough to catch the miller in.

- *Goodwin Creek/Perquimans River* — A tributary of Perquimans River, Goodwin Creek offers a half-day excursion. By combining this upland hardwood stream with the Perquimans River Trail, you can create a longer canoeing experience.

- *Big Flatty Creek* — This two-mile trail offers an opportunity to glimpse the headwaters of the Big Flatty and to view farmland as it intermingles with the forest along the banks of the creek.

- *Sawyers Creek* — A tributary of the Pasquotank River, this stream offers another half-day excursion and presents a variety of native plant and animal life.

- *Areneuse/Mill Dam Creeks* — These trails are best traveled at a leisurely pace so that you can savor the intimacy created by the canopy of towering hardwoods and the very narrow streams. The mouths of these two creeks are separated by only a few hundred yards along the banks of the Pasquotank River.



*An unusual tree on the banks of Warwick Creek in Chowan County*

## Longer Excursions

- *Upper Perquimans River* — This 12-mile trail offers a challenge if you can pace yourself and complete it within a day. The stream passes by the farm owned by baseball legend Jimmy "Catfish" Hunter.

- *Yeopim Creek and Yeopim River* — This system of trails encompasses several streams: Yeopim Creek, Yeopim River, Burnt Mill Creek, Bethel Creek and Middleton Creek. These waterways and their access points can be combined in a number of ways to suit your schedule.

- *Upper Pasquotank River* — This trail affords one of the few opportunities in the Coastal Plain to combine overnight camping with a canoe trip. At the river's junction with the Great Dismal Swamp Canal, a high spoil bank overlooking the water offers a dry place to spend the night. While

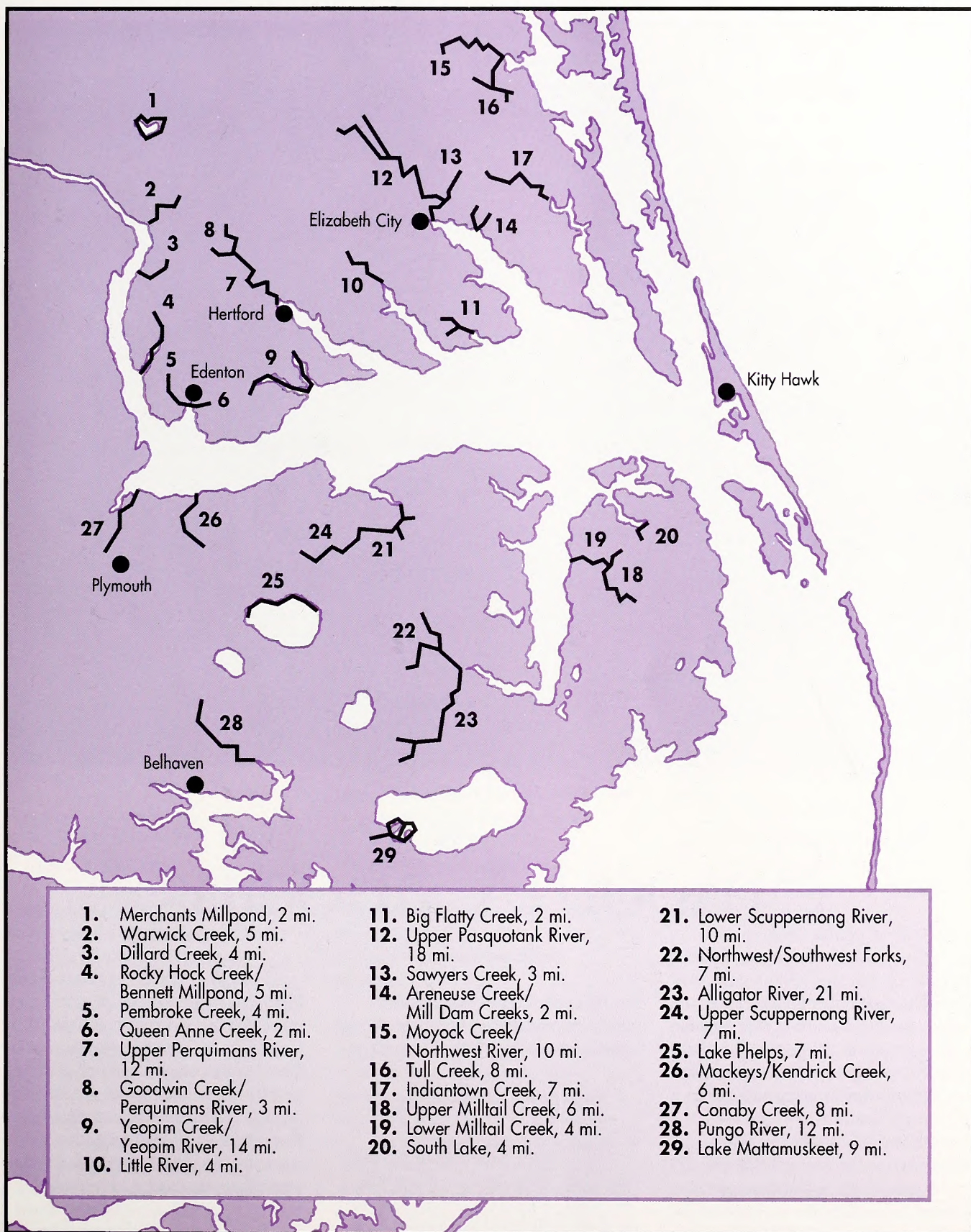
there, you should take precautions against some of the natives, including cottonmouth water moccasins. By using a cut-through four miles below the access point, you can travel north up the Dismal Swamp Canal, portage around the locks and dams at South Mills and continue up the canal to the welcome center located on U.S. 17. The canal to Lake Drummond is located a few miles north of the welcome center. While portaging around the locks and dams at South Mills, you can enjoy an excursion through the town and a visit to local eateries.

- *Moyock Creek/Northwest River* — Beginning at an unusual camelback bridge in Moyock, you will embark upon a 10-mile trip through hardwood swamps that turn into flat marshes along the river. Before reaching the Tull Bay Marina, you can explore several coves and oxbows.

- *Indiantown Creek* — Probably one of the best-known streams in the region, this trail allows an all-day outing. A loop downstream provides a return path to the access point at the community boat ramp on the county line. Consider exploring a tributary called Frog Crik, which presents a closed-in canoeing experience beneath a canopy of trees.

- *Alligator River* — The "granddaddy" of the Albemarle Region Canoe Trails system, this 21-mile trail is the longest offered. However, several access points provide the opportunity to conduct your outing in small trips. The river is lined by marshes dotted with solitary dead trees. ■









Rodney Johnson

*An outing on the Little River*

# Smooth Canoeing

*By Daun Daemon*

**S**hooting down the churning rapids of a ferocious river may be the stuff of armchair dreams, but for most of us it's too wild a ride in reality. If you're hankering to give canoeing a try, though, northeastern North Carolina's many waterways offer tamer courses for your introduction.

A jaunt down one of the Albemarle region trails can be a fun way for you or your family to spend a

day, but only if you've planned carefully, prepared well and recognized a few points of trail etiquette.

## Getting Started

Bill Sterritt, professor of physical education, associate dean of curriculum and a canoeing/kayaking instructor at the College of the Albemarle in

Elizabeth City, says that people interested in canoeing should get instruction before taking to the water. Community colleges and universities usually offer courses, and private schools and instructors can often be found by inquiring at stores that sell canoeing supplies. If you have a friend who canoes, tag along to learn the basics.

Every spring, the National Trails



Day celebration offers an opportunity for folks to test one of the Albemarle trails with fellow canoers. Sterritt, who calls the trail system "The Great 29," has organized an outing for two years, and more than 100 watercraft have participated. In 1995, paddlers ventured down part of the Little River, and in 1996, they explored the upper reaches of the Pasquotank River. Organizers provide lunch for the half-day event, and they also offer canoes and kayaks for the day.

Sterritt says the celebration is important not only to bring attention to the trails, but also to give people a sense of ownership and responsibility.

"If we as citizens and users continuously pollute the waterways and if we block that out of our minds, they're not going to be there in years to come," Sterritt says. "The celebration is intended to develop an awareness of and appreciation for these water trails."

Novices as well as experts can be part of the flotilla. Sterritt says the organizers take care to ensure that the event is safe and enjoyable for paddlers of any skill level.

If you decide to set out on your own, however, you'll need to keep the following tips in mind.

## Before Your Trip

Select your access point for entering and leaving the water and plan to spend about an hour for every two miles of trail under normal conditions. Don't forget to figure in your driving time, including dropping off a car at the end point and shuttling to the starting point.

Tom Potter, eastern North Carolina trails specialist, recommends that at least two people canoe together and even suggests taking two canoes so that one person can get help quickly if an emergency arises. Also, a friend or relative should know your itinerary and when to expect you back.

A weather check is another precaution you should take before setting off on your canoeing adventure. If heavy rains occur before your outing, high and swift-moving water could make waterways hazardous. Or, if conditions have been dry and the water level drops, your trip could be hampered by exposed logs and stumps. You'll also want to check the weather forecast so that you can avoid windy, stormy or very cold days on the water.

Finally, choose a canoe trail that matches your ability. If you are a beginner, opt for slow-moving creeks and shorter trails.

## What to Take

In addition to the obvious — boats, paddles and life jackets — you need to carry some other items to ensure a safe and comfortable excursion. Place anything that you don't want to get wet in plastic bags or containers, and tie down all items in the boat to secure them. Take only the essentials; overloading a canoe can cause it to tip more readily.

Carry plenty of snacks for short trips and substantial meals for day trips. Include bottles of drinking water — at least a quart per person.

Always carry a first-aid kit and add sunscreen and insect repellent. Additional items may come in handy in case of an emergency: good walking shoes, knife, whistle and waterproof matches.

Other necessities include toilet paper, extra dry clothing, money and sunglasses. Don't forget to stow away your car keys. A zippered jacket pocket is a safe bet so that you won't lose them in the event of a dunking.

Take along a map or description of the watercourse if available. And don't forget to include an implement for bailing water, an extra paddle and a flashlight with spare batteries.

## While on the Trail

Though the streams and rivers comprising water trails are in the public domain, the associated land generally is not. Much of the surrounding banks and countryside is privately owned, and you should explore or camp in these areas only with the permission of the owner.

Respecting the land is another must. Pack out your trash, and don't pour or throw anything into the water. A camp stove is the preferred cooking method, but if you must use a campfire, take care when building and dousing it. Avoid cutting live trees because they are someone else's property.

Owners of the adjacent lands are not the only ones deserving consideration during your outing. Wild animals abound along many of these trails, and you should make sure that no one in your party bothers them in any way.

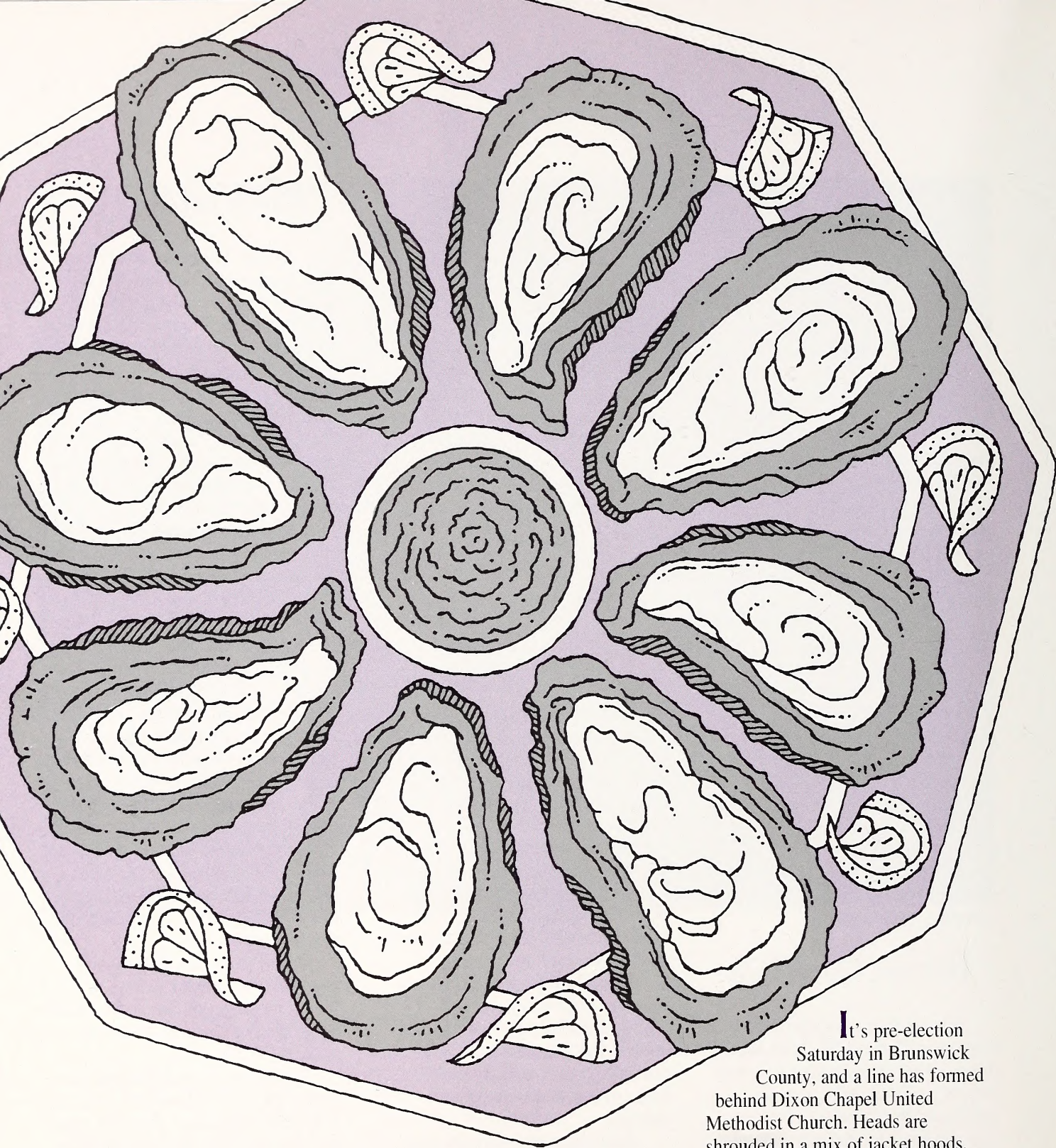
You may come across potentially threatening animals — in this area, snakes and bears. To avoid a close encounter with a cottonmouth water moccasin or other snake, don't canoe under limbs overhanging the water. If you spot a bear nearby, canoe quietly past or stop and wait for the animal to mosey along.

Says Potter, "Encounters with aggressive animals are extremely rare. If you run across wildlife, remain calm and give the animals as much room as possible."

Finally, keep safety foremost in mind. Make sure that each person in your party wears a life jacket — simply having it available in the canoe is not enough. And leave alcohol and horseplay at home. The best way to enjoy your canoeing experience is with a clear mind and a peaceful spirit.

*The National Trails Day celebration for 1997 is in the works. For more information on how to participate, contact Sterritt at 919/335-0821, extension 212. ■*





# A Trip to Oysterville

*By Carla Burgess*

It's pre-election Saturday in Brunswick County, and a line has formed behind Dixon Chapel United Methodist Church. Heads are shrouded in a mix of jacket hoods, hunting caps and plastic rain bonnets as a steady but not too cold drizzle dampens the crowd.

A local candidate for state Senate and an aide are as persistent as the November mist, working the line with fliers, proffering moist hands for shaking. At first glance, this might be the beginnings of a stump session. But the condiments and paraphernalia give



away the reason for the gathering. Under the occasional umbrella, people are clutching their favorites: cocktail sauce, jars of hot peppers, saltines, oven mitts, prized oyster knives.

"Hi, I'm ..." says the politician, the only one among us in a suit and tie, when he comes to my place in line. But I interrupt, "We're from Wake County." With blinding speed, the man withdraws the campaign card he's handing me and deals it to the woman behind us.

"Just wait a minute. Are you a Democrat or Republican?" she asks briskly.

"Republican," he replies.

"Well, you can just keep that, then."

"I'm a Republican. I'll take it," booms a man's voice farther back in line, and a few people chuckle. It's obvious these folks aren't too interested in any campaign rhetoric. Like my friend and me, they've come for one thing: Lockwoods Folly oysters, smoked over barrels of burning hickory, all you can eat for \$12. This annual gathering is nonpartisan. It's integrated. It's ecumenical. There's even room on the same table for Texas Pete and Tabasco.

I'd gotten the tip early in the week from the other half of the family oyster-appreciation network — the man who taught me to relish sardines with mustard, Spanish olives, hot dogs with sauerkraut and, yes, even raw oysters plucked right from the shell.

"Insiders know this is the biggest and best oyster roast around," Dad said over the phone, reading from a blurb in the Wilmington paper as if he were issuing a call to arms. The directions sounded deliciously surreptitious. To get there required many turns on back roads; the writer provided landmarks such as junkyards. Bring your own oyster knife and dipping sauce, it read. *This* was the real nitty-gritty.

Dad wasn't sure he could make it

there, so I needed a partner for the trip. Unlike brownies, which I'm perfectly content to consume alone by the panful, oysters are meant to be shared. And unfortunately, although it's painful to disclose, my husband understands the appeal of neither oysters nor fried okra.

I made a phone call to my friend Tracy in Garner. A landlubber from Wilson, he eagerly accepted the offer to consume fine oysters in a traditional setting. It's three hours, but it should be worth it, I promised, reading him the quirky directions.

On THE morning, we leave Raleigh later than planned, without sauce or butter, spilling coffee in the car and turning around once to gather a road map and some CDs. We aren't prepared. We aren't worthy.

As it turns out, even sauceless amateurs are accommodated at Varnamtown (also spelled Varnum, depending on which road sign or tombstone you read). Under the tin-roofed shelter, complimentary trays of jalapeños and butter circulate among the crowded tables. In a screened-in area in back of the shelter, apron-clad women drop dollops of cornbread batter into vats of oil. The small, round cakes are placed freely on the tables in baskets at regular intervals. Tracy and I walk timidly to the back of the middle table.

"What's the protocol here?" I ask, pulling a buck knife with a 5-inch blade from the pocket of my sweatshirt (to clarify, I'm from a family of oyster-eaters, not competent shuckers).

"The protocol?" says a tall man beside a pile of spent shells, eyeing me suspiciously. "The protocol is you grab an oyster, open it and eat it."

But getting to the oysters involves wedging into a tight spot next to him without appearing too pushy. He doesn't seem to care, but he does look a little worried about my knife. I take a quick accounting of the well-dulled,

short blades being wielded around me; I feel like a sheepish Crocodile Dundee. Once I open a couple of the well-roasted oysters, I realize this is like using a chainsaw to cut butter, as I overheard someone say recently, and a mortal wound may be close at hand. The oysters are cooked well, and the shells give little resistance; an abandoned table knife nearby proves tool enough for the job.

I won't say we achieve a groove, but Tracy and I eventually manage to have more empty shells than closed ones in front of us. Every 15 minutes or so, two men in boots and rain slickers dump a new heap of steaming hot oysters in a central spot on the table. Then the diners rake piles from the middle of the table toward them like cumbersome poker chips. The oysters are perfect: small and well-done but tender, deliciously briny with a smoky flavor from the hickory fire. Because of my lack of deftness or neatness, each morsel I manage to extract also wears a generous sprinkling of ash and other unidentified organic material.

"You have to like eating dirt," interjects my neighbor. "That's what the cornbread's for — to flush out the grit."

There's also ice-cold cans of cola, though I take the first swallow with skepticism. Dad and I traditionally take our oysters with beer and none of that microbrewed stuff. You don't want to overshadow the entrée. But at Dixon Chapel's roast, alcohol is prohibited, and we honor this rule. It's really the only thing that reminds us we're at a church-sponsored function (that and the lack of swearing, which you'd really only hear if the oysters were bad). Oh, and I do strike up a conversation with a fellow in a wheelchair who asks me where I am from. When I answer, "Raleigh," he replies in a sympathetic molasses-thick voice: "That's OK. The Lord'll forgive you anyway."

*Continued*



We're not the only out-of-towners. As near as we can determine, people travel from all over to attend this event, which has been going on for at least 30 years. A woman from Conway, S.C., sits in a folding chair near the back. She's waiting for her husband to get full, she says. There are people from Myrtle Beach, Lumberton, Goldsboro, Fayetteville and Wilmington. Another satiated customer nearby introduces herself in a unique way. She shows me her personal oyster knife. It was a Christmas present, she says proudly, her hand cupping the pear-shaped wooden handle. She tilts the short silver blade to the light to reveal her name engraved on the metal: "Ruth."

Locals with personalized knives aren't a surprise in a county that has sent many of its own to the nation's oyster shucking championship. Three-time state champion Shirley Simmons lives only a few miles away in Supply. She's not here today, and that's probably because, go figure, she doesn't like to eat oysters. But she can snap open a raw one, cut the elastic abductor muscle with an adroit turn of the knife and lay the quivering grayish mass neatly back into its lustrous shell in a matter of seconds. With no grit, no scratches, nicks or cuts on the mollusk or its shell. In front of a crowd at Shallotte High School at the N.C. Oyster Festival in October, flanked by news photographers and judges with stopwatches, Simmons opened and perfectly displayed two dozen oysters in an "adjusted" time of two minutes, 35 seconds. The adjusted part means the judges scrutinize the shelled oysters for any imperfections or debris and add seconds to the contestants' final scores. Simmons won \$100 and a trip to the nationals next October in Leonardtown, Md. She took third place and \$300 during her last trip to the competition in 1994.

A few weeks after the Varnamtown roast, Simmons graciously agrees to let me come to Robinson's Seafood at Holden Beach one afternoon and watch her work.

"You drove all the way from Raleigh just to take my picture?" she says incredulously, meeting me in the parking lot of the cinder block scallop-and-oyster house. She seems nervous and wholly humble in spite of my awe at her shucking prowess. She even shrugs off her ability as nothing special. But inside, with the gloves on and her knife moving skillfully, her pride swells slightly.

"This is no easy job," she says, "but I love to shuck oysters."

I've read it takes about 20 pounds of pressure applied at once to open a 3- to 4-inch oyster. Simmons seems to open the shells effortlessly in a single, fluid movement. But in spite of what my eyes tell me, I know it must take at least two movements — one to open the shell and one to retrieve the meat. Simmons, 42, has been doing this for 15 years. It took her three months to get the hang of it, she says, letting each plump, barely steamed oyster plop into pint-size stainless steel bowls. These oysters came from Texas and Louisiana, she says, and though she's not partial to eating oysters, she allows that the flavor of North Carolina's harvest is superior.

"You can tell an oyster from here. They're smaller. Their shells are green." And, she adds, they're plenty salty. "These oysters don't have any taste," she says, nodding toward the imported mound in front of her.

To eat, Simmons likes scallops. To make money, she likes oysters. At work she gets 75 cents for each shucked pint. And the contests, when she can find a sponsor, give her a chance to win a few hundred dollars and to travel. She hasn't won a U.S. title, but if she did, she might get a chance to compete in an international competition — in Italy or Norway or Ireland.

"What's the world record for shucking oysters?" I ask. There must be one.

Simmons says she doesn't know.

I can't resist investigating this during my next visit to a bookstore.

Sure enough, in italics in the index of the *Guinness Book of World Records* is the topic "oyster opening." I flip excitedly to the page to learn the answer. Mike Racz holds the record, the book declares. He opened 100 oysters in two minutes, 20.07 seconds on July 16, 1990. I stand slack-jawed right there in the reference section. Impossible, I think, wondering what Simmons would say.

I mull over all this oyster lore on a drive to my folks' a couple days before Thanksgiving. I'm wondering what it is about oysters. What's so singularly wonderful about pursuing them, eating them? I'm hauling a bushel of North Carolina oysters in two cardboard boxes in the back of my minivan, leaking half of Stump Sound into the carpet. The inside of the car smells like the ocean. I'm returning home from Wilmington and plan to stop over at my parents' with a surprise for dinner.

For all our talk about oysters, we really eat them only a few times a year, preferably when the atmosphere and circumstances are ideal. Later that evening, I realize why. It's the same reason most people have pumpkin pie only during the holiday season. Eating oysters remains a cherished — even sacred — treat, worth waiting for all year if one has to. It shouldn't be overdone. I find this out later that night.

Taking a shortcut that would horrify true connoisseurs, Dad and I heat the Stump Sound oysters in the microwave until the lips of the shells part. Then we suck them down with butter and a homemade sauce of ketchup, lemon juice and horseradish. A half-bushel later, we feel as if our eyeballs and bellies are bulging beyond repair. Neither of us can eat another oyster. We look at each other, defeated but satisfied. We're going to have to find someone else to finish the bushel. I officially declare the end of oyster-eating season ... until next year. ■





Courtesy of Department of Cultural Resources, Archives and Records

*Scraping for turpentine at the turn of the century.  
The technology for harvesting turpentine had changed little since pre-Civil War days.*

## *The Rise and Fall of the Rich Lands*

*By David Cecelski*

*The story of an Onslow County turpentine planter sheds brilliant light on the coast's most important industry before the Civil War — but it also unveils an untold saga of ecological ruin.*

Recently I walked across the former site of the Rich Lands plantation in Onslow County, a shining jewel in the naval stores industry of the Old South. John Avirett and more than 125 slaves built a kingdom out of the longleaf pine's sap, producing vast quantities of turpentine, tar, pitch and rosin. Long gone, the Rich Lands once sprawled across more than 22,000 acres just east of what is now the town of Richlands,

between Kenansville and Jacksonville.

With the help of Dennis Jones, a local historian and educator, I went in search of the Rich Land's former glory. Poking around pine woods, we found circular imprints of old tar pits still scarring the earth. Dennis showed me a thick layer of rosin residue by the banks of Catherine's Lake, the former site of Avirett's turpentine distilleries. He also pointed out an old rice dam and a well-chiseled marl bed, once a source of lime for the plantation's fields. Toward dusk he led me to Alum Spring, which rises out of a gaping limestone rift. Now in deep forest, the spring was a popular picnic spot for some of the wealthiest

planters in North Carolina.

Finally, Dennis showed me the way to the Avirett family cemetery. It was only a few graves surrounded by a crumbling brick wall tangled in trumpet vine. Not far off, we barely made out the low spot where the Rich Lands slaves are said to have buried their dead.

Dennis and I recognized these landmarks because James Battle Avirett, John's son, wrote an extraordinary memoir of growing up at the Rich Lands. Published in 1901, *The Old Plantation* is an unparalleled account of our turpentine boom days — the days that made us Tar Heels. After reading Avirett's memoir,

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*Collecting turpentine from a notched tree*

you can practically see the Rich Lands as it was 150 years ago: the fine manor house, the slave quarters, the distilleries, the picnics at Alum Spring and the great piney woods itself. No aspect of Rich Lands life or turpentinizing seems to escape him.

Yet Avirett does not tell all. I discovered that behind *The Old Plantation* is an untold saga, a mystery far more intriguing than the book itself. In reality, Avirett's flattering portrait of the Rich Lands conceals a stunning tale of ecological ruin and personal tragedy. It is a story of nostalgia and deceit that goes to the heart of how we remember the Old South today.

The longleaf pine, *Palus palustris*, once defined the American South as distinctively as the tall-grass prairie set apart the Great Plains. The longleaf forest covered 130 million acres in a 100-mile swath from Tidewater Virginia

to East Texas. Carolina colonists distilled the longleaf's crude sap (turpentine) into "spirits of turpentine" and rosin, and they produced tar and pitch by smoldering longleaf wood in earthen kilns. These products were known as naval stores because they played a critical role in caulking ships and preserving hemp lines.

By 1840, North Carolina produced 96 percent of the turpentine, tar and rosin in the United States. The vast majority came from 12 coastal counties, including Onslow. Wilmington exported more naval stores than any other port in the world. After prices rose steeply with the removal of British duties on U.S. turpentine in 1846, Wilmington doubled in population and became the state's largest city.

New uses for turpentine as a solvent, paint ingredient and illuminant raised the naval stores industry to even greater heights. The number of

Wilmington distilleries skyrocketed from two in 1841 to more than 20 in 1852, from one in Fayetteville to 32. Naval stores became the third most important agricultural commodity produced in the South, exceeded by only cotton and tobacco.

The Avirett family stood at the pinnacle of naval stores society. An Avirett of German Huguenot descent had settled in Onslow County by 1747, and the family grew prosperous enough by 1791 to host President George Washington during his Southern tour. John Alfred Avirett, born in or about 1797, gradually built a turpentine empire that included a 20,000-acre longleaf orchard, 125 slaves and a magnificent three-story manor house. He was also Onslow County sheriff for two decades.

His son James, the author of *The Old Plantation*, was born at the Rich Lands in 1835. He became an Episcopalian priest and served as a Confederate chaplain during the Civil War. After Appomattox, he directed a Virginia seminary and was later rector for several churches in New York. When he returned to North Carolina in 1894, he often spoke at Confederate veterans days and soldiers reunions, where he extolled the virtues of antebellum life at the Rich Lands. Before he died in 1912, he gained a measure of fame for reputedly being the oldest living Confederate chaplain.

In *The Old Plantation*, Avirett vividly recalls the making of naval stores at the Rich Lands. It occurred almost in a world unto itself. The piney woods — or turpentine orchard — ran all the way from the New River to the White Oak pocosin. The distilling center was located at Catherine's Lake, about three miles from the main house. It included two distilleries, cooperage shops and a glue house for making barrels, as well as mule stables, barracks, storage sheds and a windmill.

A slave named Philip oversaw the production of about 30,000 barrels of turpentine a year. He was second in command to John Avirett himself in



managing the Rich Lands. James Avirett describes the slave manager as “very little, if any, inferior to any man, white or colored.” His father consulted with Philip nightly about the plantation’s business, and Philip presented a full accounting of the week’s progress to his master every Saturday morning. Averitt admits that “without him [my father] would have been sadly at sea.”

Turpentine began every year by burning away the undergrowth in the pine forest to open the woods to slave laborers. In the late fall and winter, 25 to 30 axmen cut “boxes,” shallow V-shaped incisions in the bark that exposed the pine sap and directed it down to a single point. There, the workers had hewn a small bowl capable of holding about a quart of raw turpentine. Using long iron blades called roundshaves, axmen kept the sap flowing into those bowls all summer by periodically chipping away dried sap.

Slaves next moved with dippers through the pines to collect the turpentine out of the boxes and empty it into barrels scattered about the woods. Draymen carried them in mule carts to Catherine’s Lake, where a slave named Harry oversaw the distilling, an art every bit as sophisticated as making good bourbon.

The success of the naval stores industry relied on slave skills, but Avirett admits that “close surveillance” of the slave workforce was simply impossible. Unlike other Southern plantations, turpentine workers ranged over hundreds of acres of remote woodlands. Working alone or in pairs, they stayed in primitive camps with little oversight during boxing, chipping and collecting. The work was arduous, the heat unbearable, the housing squalid, the insects a scourge.

Yet, compared to other slaves, naval stores workers had certain blessings. Since Avirett could not keep an eye on his forest workers, he tried to spur them “to their best work” by paying rewards if they exceeded his quotas for boxing, chipping or barrel making. Thus they had money to spend at a store located at Philip’s cabin or, to Avirett’s



“Sweating out” tar from pine in a turf-covered kiln

dismay, in a black market that thrived on the plantation’s outskirts. The slave turpentiners must also have relished their independent life in the piney woods.

Now we come to the grave — and telling — deception at the heart of *The Old Plantation*. Avirett credits the naval stores industry with building the Rich Lands, but he refuses to acknowledge that it was also his family’s downfall. *The Old Plantation* describes the Rich Lands as an idyllic paradise (think *Gone With the Wind* here) right up until the Civil War. And he bitterly blames that horrible war and the freeing of the slaves for destroying the Rich Lands.

In reality, the Civil War had nothing to do with its ruin. From Onslow County records, I discovered that an ecological donnybrook — the destruction of the longleaf forest —

brought down both the Rich Lands and the Avirett family in 1857, four years before the Civil War.

In the 1840s and 1850s, the naval stores industry was rapidly destroying the longleaf pine forest. Avirett does not mention deforestation in *The Old Plantation*, but contemporary travelers often commented, in one’s words, on seeing “nothing but Pinewoods ... on whose trees the process of gumming turpentine was visible.” The famed agriculturalist Edmund Ruffin, a friend of the Avirett, observed that “scarcely a good [longleaf] in North Carolina has escaped the operation.”

The average lifetime of longleafs after boxing was only about six years. According to G. Terry Sharrer, a Smithsonian forestry historian, 100 gallons of turpentine was the product of 12 to 14 acres of longleaf forest. When Wilmington’s exports rose from 7,218

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*James Battle Averitt*

barrels in 1847 to more than 120,000 a decade later, every 50,000-barrel increase in output came at the expense of another 250,000 acres of piney woods. Even turpentine orchards as large as the Rich Lands eventually succumbed to ax and roundshave.

During the turpentering boom, planters such as the Avirets, with heavy investments in slaves and land, rushed to box new longleaf stands. It was a self-destructive spiral downward. Many reportedly collected only the first season's pine sap, the so-called "virgin dip," because it earned the highest prices. High winds, disease and pine

beetles ravaged the weakened trees. And controlled burns and free-grazing hogs consumed young seedlings, depriving the forest of a chance to regenerate.

Confronted by dying forests, many turpentiners abandoned North Carolina. They shifted the naval stores industry's center to the pine barrens of South Carolina and Georgia, then onto the uplands of Alabama, Mississippi and Louisiana, and finally to eastern Texas. Depression hit the piney woods of Onslow County, and the population plummeted 30 percent between 1820 and 1860. Many of John Avirett's closest friends survived by diversifying

into railroads, shipping or banking. Avirett did not. He was a man of the earth, and he clung tenaciously — and fatally — to the Rich Lands.

Personal tragedy hastened his downfall. In February of 1851, the Rich Lands manor house burned to the ground. Not long after, he lost two daughters during childbirth. The fresh graves and dead longleafs must have made the Rich Lands seem like a cursed place in the 1850s. Yet only nostalgia, and not a word of these tragedies, is found in *The Old Plantation*.

The final straw came in 1857. John Avirett, by then a pitiful figure, sold the family's new house and 10,000 acres for \$25,000. He abdicated another 10,000 acres "together with the turpentine distilleries and fixtures" for \$20,000. He must have been deeply in debt. Not only did he sell the family homeplace and ancestral graveyard, but he soon relocated to Goldsboro, where he was virtually penniless by 1860. He seems to have died in or about 1863. Local legend says that he perished in a poorhouse or insane asylum.

I have returned to the Rich Lands often since Dennis first shared its secrets with me. I like to walk to Alum Spring, such a quiet, restful spot, and when I am there I often wonder why James Avirett blamed the Civil War for his family's ruin. I imagine that he never recovered from the shock of losing the Rich Lands in 1857. He had to blame some greater power than a dwindling forest. But I also suspect that Avirett wanted to glorify his father and all the old Southern planters. He wanted, most of all, to help the world forget what they had done to the South, to the land and all its people. ■

*David Cecelski is a historian at the University of North Carolina-Chapel Hill's Southern Oral History Program and a regular columnist for Coastwatch.*





## Hands-On Stream Repair

The consequences of construction, paving and other changes to our natural landscapes are often borne by streams, creeks and rivers. These waters are degraded when we build nearby, fill in floodplains, straighten out their curves and dredge their canals.

The result is often a steep, eroded, unhealthy stream that is less likely to support aquatic wildlife. But this damage can be corrected through bioengineering.

North Carolina Sea Grant is offering a two-day workshop in March to teach bioengineering techniques to resource managers and design professionals.

The traditional stream repair methods are typically costly and can destroy aquatic habitats and the natural beauty of streams. Culvert pipes or concrete-lined channels can accelerate the flow of water, which can worsen erosion and flooding downstream.

Bioengineering is a less expensive and more environmentally sound alternative. It pairs engineering principles and biological expertise to reduce erosion and maintain a more natural stream.

Last year, more than 60 people participated in a similar workshop. One hundred feet of eroded streambank on Rocky Branch Creek in Raleigh was repaired using bioengineering techniques. The repair withstood the heavy rains and severe flooding from Hurricane Fran.

Workshop space is limited. For more information, contact Barbara Doll, Sea Grant's coastal water quality specialist, at 919/515-5287.

## Interim Director Named

North Carolina Sea Grant Associate Director Ron Hodson has been named the program's interim director. Hodson has served as the program's associate director for more than 15 years.

A committee is being assembled to launch a nationwide search for the next North Carolina Sea Grant director.

## North Carolina Sea Grant Researcher Dies

Sea Grant researcher Kimon Bird, a biologist at the University of North Carolina at Wilmington, died in late October.

Bird's marine biotechnology research focused on producing seagrasses through tissue culture, a technique known as micropagation. Bird and other Sea Grant scientists hoped that micropagation of wetland plants could play a key role in habitat restoration and mitigation for the future.

His research, along with that of other Sea Grant researchers working in the area of plant micropagation, had been featured in a recent North Carolina Sea Grant publication, *Wetland Plants From Test Tubes*, written by Carla Burgess.

"Kimon's untimely death is a significant loss to the research community in North Carolina and to the Sea Grant network," says Interim Sea Grant Director Ron Hodson. "He was an excellent scientist and a fine person. We'll miss him."

## Encouraging Ecotourism

North Carolina's Coastal Plain is a rich natural area with an abundance of rivers, swamps, cypress forests, estuaries and barrier islands. Until recently, only fishermen and hunters explored these Coastal Plain treasures — tourists rarely ventured away from the mesmerizing sun and surf of the ocean beaches. But a new attitude of respect and appreciation for the environment has begun to change the way people vacation and has given rise to an entire industry called *ecotourism*.

An upcoming workshop will introduce the resources of the Coastal Plain for nature-based businesses and present information on ecotourism in eastern North Carolina. The Coastal Plain Nature-Based Tourism Workshop, sponsored by North Carolina Sea Grant and Partnership for the Sounds, will be held March 1, from 8:30 a.m. until 4

p.m. at Lake Mattamuskeet Lodge in the Mattamuskeet National Wildlife Refuge in Hyde County. An oyster roast from 4:30 p.m. to 6 p.m. will cap off the event.

Participants will attend informational talks by folks experienced in nature-based tourism. Among the speakers will be Bob Woody of the Cape Hatteras National Seashore and Bonnie Strawser of the U.S. Fish and Wildlife Service, discussing public access to federal land; Jim Murray of North Carolina Sea Grant and Rebecca Dunning of the Tidewater Research Station, discussing innovative and emerging nature-based companies; and Kristin Rowles of the Pamlico/Tar River Foundation and Jim Falk of Delaware Sea Grant, discussing the importance of natural resources for sustainable economics.

Anyone with an interest in nature-based tourism in the Coastal Plain can take part, but space is limited to the first 100 people who call, fax or write in their intent to attend. Registration and lunch are free. The oyster roast carries a \$5 fee, which is payable at registration. Contact Partnership for the Sounds, P.O. Box 55, Columbia, NC 27925 (telephone: 919/796-1000; fax: 919/796-0218) by Feb. 21.

## Communicator Leaves

After more than six years as a Sea Grant communicator, Carla Burgess left the program in mid-October to pursue free-lance writing and editing opportunities. While at Sea Grant, Burgess was a regular contributor to *Coastwatch*, provided the voice-over for *Seascope* radio public service announcements, edited and designed *MAS News* and *Conch Shell*, and produced countless publications, including the award-winning *Wetland Plants from Test Tubes*.

"Carla is a wonderful writer and an excellent editor," says Kathy Hart, Sea Grant's director of communications. "We'll miss her tremendously, and our *Coastwatch* readers will too. But we wish her the best of luck in her new endeavors." □



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# Coastwatch

## Spring Arrivals

*I N C L U D I N G*

Coastal Cemeteries

*P L U S*

Turtles in Trouble

*A L S O*

Knotts Island



**Coastwatch Staff:**

Kathy Hart, Managing Editor

Jeannie Faris Norris and Daun Daemon,  
Senior Editors

L. Noble, Designer

Sandra Harris, Circulation Manager


The North Carolina Sea Grant College Program is a federal/state program that promotes the wise use of our coastal and marine resources through research, extension and education. It joined the National Sea Grant College Network in 1970 as an institutional program. Six years later, it was designated a Sea Grant College. Today, North Carolina Sea Grant supports several research projects, a 12-member extension program and a communications staff. Ron Hodson is interim director. The program is funded by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration and the state through the University of North Carolina.

*Coastwatch* (ISSN 1068-784X) is published bimonthly, six times a year, for \$15 by the North Carolina Sea Grant College Program, Box 8605, N.C. State University, Raleigh, NC 27695-8605. Telephone: 919/515-2454. Fax: 919/515-7095. E-mail: [k\\_hart@ncsu.edu](mailto:k_hart@ncsu.edu). World Wide Web address: [http://www2.ncsu.edu/ncsu/CIL/sea\\_grant/index.html](http://www2.ncsu.edu/ncsu/CIL/sea_grant/index.html). Second-Class Postage paid at Raleigh, N.C.

POSTMASTER: Send address changes to *Coastwatch*, North Carolina Sea Grant, Box 8605, N.C. State University, Raleigh, NC 27695-8605.

*Front cover photo of "the watering hole" on Shackleford Banks by Scott D. Taylor.*

*Inside front cover photo of a Cedar Grove tombstone by Scott D. Taylor.*

*Printed on recycled paper.* 



## Features

### Traipsing Through Time

When was the last time you visited an old cemetery? North Carolina's coast offers some of the oldest and most intriguing burying grounds around. *Coastwatch* staffer Jeannie Faris Norris takes readers on a tour of graveyards in Beaufort, Cedar Island and New Bern. The history from these sites could fill a textbook — but why not fill an afternoon with a visit to these repositories of our past? ..... **2**

### Speaking from the Grave

Sometimes folks are outlived by the tales of their lives. They don't have to be especially famous to go down in history — just interesting. Meet some of the more colorful characters interred at the Old Burying Ground, a Cedar Island family graveyard, Cedar Grove and Christ Episcopal Church cemeteries. .... **7**

### What Can You Read from a Tombstone?

Without even reading epitaphs, you can learn something about the people they memorialize by studying the tombstones. The designs and materials used since the mid-1700s can tell you when people died, how wealthy they were and how old they were. Tombstones also reveal something about peoples' attitudes toward death in centuries past. *Coastwatch* staffer Jeannie Faris Norris explains some basic tombstone symbols and designs. .... **11**

### Signaling the Return of Spring

It's spring. Longer days. Warmer temperatures. New growth. Increased activity. Lots of baby critters. Along North Carolina's coastal shores, these are among the signals that the cycle of life renews itself. Free-lance writer Odile Fredericks reminds readers what spring is all about in coastal estuaries and wetlands. .... **12**

### Up Against an Ocean of Odds

Sea turtles have survived on Earth for millenia, but only recently have humans begun to keep track of them. Those who do so — from biologists to volunteers — are concerned because the number of sea turtles that strand on our beaches has increased. *Coastwatch* staffer Daun Daemon investigates this trend and explains why researchers cannot provide clear conclusions about its cause. She also introduces readers to the Sea Turtle Stranding and Salvage Network, an organization working to understand turtle mortalities and perhaps one day turn the trend around. .. **16**

### A Historian's Coast:

#### Henry Ansell's Recollections of Knotts Island

When a nor'easter blew over Knotts Island in 1846, homes disappeared under the waves, dunes and forests vanished, and livestock were swept away in the surge. "All stood aghast" in the aftermath, according to Henry Ansell, a Knotts Islander who recounts the furious nor'easter in his book *Recollections of a Life Time and More*. Now, more than 150 years later, free-lancer David Cecelski makes a wintry trip to Knotts Island and revisits the storm in the pages of Ansell's book. .... **23**



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Scott D. Taylor

Scott D. Taylor

Courtesy of Ruth Boettcher





# Traipsing Through Time

## *Cemeteries Offer Lessons in History and Heritage*

By Jeannie Farris Morris • Photos by Scott D. Taylor

*Sunlit tombstones in a Cedar Island cemetery*





*The coastal region boasts some of the state's oldest and most intriguing graveyards. They tell of history, legend, love and loss. Personal sentiments and grand accolades are etched into mossy stones, some barely legible anymore. The cemeteries described here — in Beaufort, Cedar Island and New Bern — are within driving distance of one another, and they represent a sampling of the history and heritage that can be found among Tar Heel tombstones.*

The guide points to a back corner of the Old Burying Ground — its northwest side — and asks what I see.

Nothing, really. It looks empty.

But actually, this flat, grassy ground holds some of the oldest bones in the Beaufort graveyard and is quite possibly its most crowded section, says Bennett Moss, who takes visitors on tours. Moss is chairman of the Old Burying Ground Committee for the Beaufort Historical Association, which maintains the site.

Like most cemeteries, plenty of secrets and stories were buried along with bodies in the Old Burying Ground. But these tales were not lost to time in isolated Beaufort — a town estranged from the mainland during its early history. Because of its geographic isolation, people stayed in the area from generation to generation, passing along stories of the more colorful residents and visitors to the busy port. Many of these characters are interred at the Old Burying Ground.

The deceptively empty-looking northwest corner is no exception to the local telltale traditions. A recent archaeological survey has confirmed that graves are there, perhaps containing victims of the 1711 Tuscaroran uprising. The skulls appear cleft from blows by tomahawks, Moss says. And records of the area indicate that it had “been depopulated by the late Indian War and Massacre.”

“We don’t know how many people

*Continued*



are back there," Moss says. "They were digging in the back to plant more bodies, and they kept running into bodies. We're not allowed by law to dig up or disturb the unmarked graves in the back. And there really is no unobtrusive way of determining an awful lot about it."

In fact, much of the cemetery's early history was pieced together from oral histories and family records.

Information about births and deaths was kept by the local Anglican Church, the established church in the 1700s. But church leaders packed and moved to Canada during the Revolutionary War, taking with them vital records of the townspeople.

As one of the oldest cemeteries in coastal North Carolina, the Old Burying Ground is listed on the National Register of Historic Places. It grew around a building used for reading the service of the Anglican Church and was deeded to the town of Beaufort in 1731. Today, its stone and wrought-iron gates contain the remains of more than 200 known graves and countless others.

Live oaks shelter these graves, time-eaten testaments to lives long past. Markers tilt from decades and centuries of exposure. They are grand and modest, inscribed and mute. Some have been scoured by wind and rain, their epitaphs obscured by time and lichens. Many graves have lost their markers, or they had none at all.

In fact, few of the earliest graves were marked by the slabs and stones that

we know today. Because there is no stone native to the coast, only the wealthy could afford to import a tombstone by water from New England. Consequently, many graves were marked by materials both modest and temporary. Small pyramids only a few bricks tall identify some graves while worn cypress stakes mark others. The

War on the Union and Confederate sides are also found inside the cemetery gates. Although North Carolina eventually joined the Confederacy, many coastal communities were sympathetic to the Union because they lacked the export agriculture economy and large plantations that relied on slave labor, Moss says. Local Confederates had a name for

North Carolinians who joined the Union army — they were called "buffaloes," but the reason isn't clear.

Nearly all of the graves, in keeping with tradition, are turned toward the east so that the buried can look upon the sun when they rise on judgment day. But unlike our modern markers, the inscriptions are on the west-facing side, away from the body.



*A Lupton family memorial on Cedar Island*

stakes, especially, were far from permanent.

"They weather so badly that in no time at all you can't see anything," Moss says. "A lot of them are gone."

A few unusual graves from the late 1700s and 1800s are bricked over in a vaulted, barrel shape. These covered graves were designed to hold the remains in place during flooding and to prevent animals from digging up bodies. One of the vaults is believed to hold a Revolutionary War soldier, Moss says. There are no records on him — just local legend and the age of the tomb, deduced from its mounded style and decrepitude.

Besides Revolutionary War soldiers, men who fought in the Civil

In this way, people were placed into the soil of the Old Burying Ground until 1825, when it was declared full. But people continued to bury their dead there until another cemetery was opened on Ann Street this century. Even today, under certain circumstances, people are still placed in the Old Burying Ground with their ancestors.

Colorful old graveyards such as this one, well cared for and beautiful, are a rich source of history, philosophy and beauty. But the roadside family cemeteries are also worth a stop.

Cedar Island, a small community northeast of Beaufort, has more than a dozen cemeteries dotting its roadsides. Toward Lola, an old graveyard contains



the Lupton family, a long-standing Cedar Island clan. Like the cypress markers in the Old Burying Ground, wood stakes are all that point to some of the graves in this tiny rural cemetery.

A family monument says that the Lupton family established itself in North Carolina in the 1760s after Christopher Lupton shipwrecked near Cedar Island.

He married Elizabeth Robinson, and they had five children. An interesting fact about Lupton was his name: In the 18th century, people named their sons after their grandfathers, not their fathers — in effect, skipping a generation each time a name was used. But Christopher Lupton had the same name as four generations before him, says Jack Goodwin, a genealogist

and retired system director for the Smithsonian Institution's library services. That was highly unusual for the times, says Goodwin, one of Lupton's descendants.

Family lore holds that Lupton was buried in the Cedar Island graveyard, but there is no way to be sure, Goodwin says. "He had a lot of land in that area, and later Luptons are buried there," he says.

Lupton was from Cape May, N.J., and he descended from a distinguished family in Southampton, N.Y. He arrived at a time when North Carolina was trying to attract settlers with an offer of 50 acres of land for every white person in a family. As a result, most of the settlers in North Carolina were from

elsewhere in the United States rather than directly from Europe, Goodwin says.

And, like the Luptons, many of the families that settled Cedar Island are still there today. Islanders have made their living commercial fishing or have found other careers. But whether they remained or settled elsewhere, their family

Bern's oldest graves. In the 1700s, Christ Church was the town's only major burying ground with a capacity to hold about 2,000 people. But the demand for burials overran its borders in the late 1790s with the first of several disastrous yellow fever epidemics, says John Green, a historic preservation consultant.

"At one point there were so many deaths they had to do mass burials," Green says. "They filled it up, and they needed another cemetery."

Space for the fever victims was found in nearby Cedar Grove cemetery, which was opened almost immediately. By 1802, it was regarded as New Bern's principal burying ground. Later expansions increased its capacity to about 20,000 people.

Christ Church deeded

Cedar Grove to the town in 1853, and plans were made to erect a wall around it, both to beautify the cemetery and to protect it from wandering livestock — a major problem in those days. Today, perhaps its most distinguishing feature is the "weeping arch" entry, a series of three marl arches built in 1854 that collect rainwater and appear to weep in sympathy with grief-stricken relatives. Local legend holds that if you're struck by one of the tears as you walk through the arch, you'll be the next one carried through in a hearse, Green says.

Those who have made their final entrance there include some of New Bern's leading citizens as well as people from all walks of life: sea captains,

*Continued*



*William Gaston's monument in Cedar Grove Cemetery*

graveyards will always attest to their deep Cedar Island roots. Plots are filled with people of the same last name — people who were buried near the homestead so that family could take care of the graves and make frequent visits.

Small family graveyards aren't the only place to find kinfolk buried together. Large clans can also be found in the plots of old urban graveyards. Two outstanding examples of these historic cemeteries are found inland in downtown New Bern at Christ Episcopal Church and Cedar Grove.

Darkened and lichen-stained, old stones at Christ Episcopal Church stand guard throughout the churchyard and in a playground. They mark some of New



politicians and plenty of children. Some remains were moved from the Christ Church cemetery, explaining the presence of tombstones from the 1790s.

The cemetery mirrors almost two centuries of history of the city and Craven County. And it is recognized as one of the state's finest collections of 18th- and 19th-century gravestones, markers and monuments — most erected when New Bern was the state's largest town and an important seat of commerce and maritime trade.

Cedar Grove boasts monuments in the form of draped urns on pedestals, classical columns, obelisks and three-dimensional figure sculptures. Aged tombs covered with large slabs

contain quaint inscriptions, and moss-grown vaults are intermingled with modern and expensive monuments of polished granite and spotless marble.

Many of the monuments and tombstones stand in plots surrounded by low brick or marl walls. Cast-iron fences, popular in the mid- to late-1800s, contain family plots. The most common tombstone designs are the vertical slabs of white marble shaped and carved at the top, but they also include the early horizontal slabs supported by low walls. Several more sophisticated versions of this design support the slabs on six urn-shaped marble balusters.

These monuments are traditional for the era, but Cedar Grove also has a couple of features that distinguish it from other cemeteries. One is the Confederate veterans monument that marks a mass burial of about 60

soldiers. The largest gravesite in the cemetery, it commemorates the dead from one of five wars that sent New Bernians to the grave.

"It's really the most amazing thing in here," Green says.

Standing 18 feet high on a pedestal, the likeness of a Confederate soldier keeps watch over the remains. Fifteen feet underground, extending the breadth of the monument's circular base, lie the



*A houselike mausoleum in Cedar Grove*

soldiers' skeletons in a vaulted grave. Their coffins long ago rotted, the bodies face east.

Another unusual feature are three houselike tombs, the likes of which you won't see anywhere else in North Carolina, Green says. These unusual graves adopted the building conventions of the early and mid-19th century in their bricks, brickwork and gabled roofs. Three of the original five survive. Two are family tombs with subterranean graves 3 to 4 feet down and shelves where the coffins were stacked. Green says they appear to have started out as normal ground burials that were taken up when room became scarce. A structure was built, the old tombstones stacked against the wall and the coffins stored on shelves.

In the 1850s, when these tombs were being built, the cemetery had a much different appearance than it does

today, Green says. A romanticism was attached to graveyards in the mid-19th century, when the gate was built around Cedar Grove and trees and flowers were planted generously throughout the grounds. Cemeteries that were laid out at this time — well after Cedar Grove was established — had winding paths, knolls, vistas, valleys, dips, streams and lakes. In an effort to romanticize the rectangular, gridlike cemetery, a

goldfish pond was added in the Victorian era.

"This was a very romantic period. People liked gardenlike cemeteries," Green says. "But they were stuck with this rectangular plan they'd created (in Cedar Grove). So they built this romantic wall around it, brought in cedar trees and more

exotic plantings."

At the time, people would come to the cemeteries to picnic or to stroll. And this pastime lived on into the 1900s, particularly in New Bern, which didn't really have any parks. "The cemetery was the prettiest place in town," Green says. "There were 10 times as many trees, flowering shrubs and exotic plantings."

In fact, during the Depression, Green says his father earned his Boy Scout merit badges studying nature at the cemetery. That was the place to find squirrels, birds and raccoons.

But the tradition of visiting the cemetery and its dead has waned, lament Green and Goodwin. People just don't do it anymore. Perhaps if they did, however, they'd learn that in their beautiful solitude and time-worn monuments, cemeteries offer a unique version of local history and heritage. ■





*A gate-shaped tombstone in the Old Burying Ground*

# Speaking from the Grave

## Tombstones Tell Some Pretty Tall Tales

By Jeannie Faris Norris • Photos by Scott D. Taylor

The ancient ritual of libating a grave is a symbolic way of bringing to life the person buried there. Memories and drink are raised in honor of the tomb's occupant.

An old family friend keeps this ritual at the Beaufort grave of **Otway Burns**, one of North Carolina's greatest naval heroes in the War of 1812. A retired professor of philosophy and religion, he comes to Burns' grave to pour a little drink into the touchhole of its cannon. Then he and a companion take drinks and recall some of Burns' legendary escapades, in effect

bringing the privateer back from the grave.

As a legalized pirate, Burns plundered 32 British merchant ships on behalf of the United States. He captured cargo and brought it back to Beaufort for auction. This way, Burns became wealthy and influential, launching his career as a state legislator after the war. His fortunes, however, turned for the worse later in his life. He died in 1850 a lighthouse keeper at Portsmouth — a position the state gave him out of appreciation for his earlier service.

Burns is one of the more colorful and notable people buried in the old graveyard. His tomb is decorated with a cannon from the *Snapdragon*, his speedy seafaring schooner. But the Old Burying Ground is also full of wonderful stories belonging to people who led lives certainly less daring but every bit as interesting as Burns'.

Their tombstones tell tales of love, tragedy and heroics.

One tomb is reputed to contain a **British soldier** who was buried standing in the 1760s. The young

*Continued*



officer was on a British ship in or near Beaufort when he fell ill, perhaps with yellow fever. At the time, North Carolina was a British colony. As he failed to recover, realizing he would die, he made a request to be buried with his boots on. His tomb says he is buried standing in salute to the king of England.

There's an old verse about this story, and it's often cited when the Beaufort burial is mentioned: "Resting 'neath a foreign ground, here stands a sailor of Mad George's crown. Name unknown, and all alone, standing in the rebel's ground."

The **Crissy Wright** mass burial contains the remains of four men who died in a shipwreck off Cape Lookout in 1886. On a bitterly cold January night, the *Crissy Wright* encountered a violent storm and tried to drop anchor. When the anchor didn't hold, the ship ran aground and began breaking apart. The people who lived on the cape in Diamond City could see that the ship was in trouble, but the water was too rough to launch any rescue boats. Three of the seven men onboard were washed away. The remaining four tied themselves to what was left of the mast and wrapped themselves in sailcloth to protect against the cold, reported to be 8 F. When rescuers found them the next day, only one sailor was still alive. As a result of this tragedy, the Cape Lookout Lifesaving Station was established in 1887. Down East, people will still say that a particularly cold day "is pretty near as cold as when the *Crissy Wright* came aground."

**Dr. James Hunt** has the unusual distinction of having married for the second time, written his will and died — all on the same day in 1848. He had come to Beaufort as an Army surgeon in the War of 1812, and he stayed on and practiced medicine. Apparently, on the day that he died, he married his house-



*A Confederate soldier's marker in Beaufort*

keeper so that he could leave his estate to her. He wanted to thank her for being a faithful and helpful servant.

An unusual grave contains a **girl in a keg**, buried in the early 1800s. For years, the 12-year-old had wanted to travel with her merchant father to London, but her mother wouldn't allow it. When she finally relented, the mother made her husband promise to bring the child back, no matter what the circumstances. So, the girl and her father traveled to London and had a wonderful time. But on the return trip, she fell ill and died. The protocol for a shipboard death is burial at sea, but her father couldn't bring himself to do this after promising his wife he'd bring their daughter home. So, he purchased a keg of rum from the ship's hold and put her body in it. The entire keg, containing rum and girl, were buried when he returned to Beaufort.

Another child was buried in a glass-topped casket. Apparently, 2-year-old Vienna Dill died in 1865 of yellow fever, which was rampant in the area. She was placed in a casket with a glass top, perhaps so that she could be viewed without people fearing contagion since they didn't know at the time what caused the fever. Legend holds that years later, vandals dug up her grave and saw that her body was intact. But when they opened the casket top, her remains crumbled. She was reburied.

The unusual marker for **Capt. Christian Wulff** of the Royal Danish Navy was imported from Copenhagen. Wulff died of yellow fever in 1856 while in port. Apparently, the ladies of the town had nursed him to no avail, and they had written to his sister in Denmark to report his fate. The sister had a marker carved and delivered to Wulff's grave. In another tragic twist to this story, the sister died as she was traveling to visit her brother's grave. She was aboard the *Austria*, which burned at sea.

The **Manney family** plot has a bittersweet love story. In the early 1800s, Dr. James Manney brought his family from New York to Beaufort. Feeling that his children weren't being educated well enough, he hired 18-year-old Charles French to tutor them. Charles had been a law student in Philadelphia, but he didn't have enough money to finish his education. So he tutored the Manney children for two years. During that time, he fell in love with Nancy, the oldest daughter. But Dr. Manney disapproved of the romance because Charles was poor, and he ordered the tutor to leave. First, however, Charles and Nancy pledged their love for each other and promised to write. And they did, but their letters were intercepted by the postmaster, a friend of Dr. Manney. He did this at the direction of Dr. Manney or



because he had his eye on Nancy — no one is sure.

At any rate, the years passed. Charles married, had two sons and became chief justice of the Supreme Court in Arizona, a territory at the time. Nancy had suitors, but she rejected them all, hoping that Charles would return. She lived alone for years before the postmaster, wanting to clear his conscience, confessed to her what he had done. When Charles was 67 and his wife had died, he wrote to the new Beaufort postmaster and asked if Nancy was still in town and whether she had married. The postmaster wrote back, saying that Nancy was there, had not married and was dying of “the gallopin’ consumption” or tuberculosis. Charles came, found Nancy and married her. Three weeks later, in 1886, she died.

**Pierre** (1812-1887) and **Annie Henry** (1816-1904) were African-American leaders in the education of emancipated slaves and their children at the Washburn Academy. Pierre was born free during the period of slavery. The school was one of many established in the South by the Congregational Churches of the North following the Civil War.

**Jechonias Willis**, a Confederate, is one of two Beaufort men killed in 1862 when Fort Macon was captured by federal troops. Beaufort members of the garrison were brought home on a flat and released on parole. The body of Willis was brought at the same time. Gen. Ambrose Burnside stood at the wharf witnessing the reunion between soldiers and family. Then, as the pine box containing the body of Willis was claimed by sorrowing loved ones, sympathetic tears were said to have rolled down the Union general’s cheeks.

**Josiah Pender** led a group of 50 men who seized Fort Macon more than a



*Otway Burns’s grave in Beaufort*

month before North Carolina seceded from the Union in 1861. An improvised Confederate flag was raised in place of the national colors. Confederate forces held the fort more than a year before it was retaken by Gen. Burnside. Pender led a secessionist militia group that he outfitted at his own expense. He died of yellow fever in 1864.

**George Davis** was a doctor in Beaufort until the 1930s. He and his father Josiah Davis practiced medicine in the apothecary shop now on the Beaufort Historic Site. When the younger Davis was just launching his medical practice, his sister came to him to deliver her baby. The birth went badly, however, and mother and child died. Davis was so traumatized that he never again attempted a delivery, he never married because he didn’t want to be responsible for putting a woman through childbirth, and he wore black

for the rest of his life.

**Jacob Shepard and Sarah Gibbs** are buried side-by-side, but Sarah was married to Nathaniel Gibbs when she died. Shepard had been her first husband, a seaman who sailed away one day and didn’t return. Eventually, Sarah remarried and was living happily with Gibbs when Shepard unexpectedly returned from being shipwrecked on a remote island. The men got together and decided that Sarah would continue to live with Gibbs, her second husband, but she’d spend eternity with Shepard. So, when she died in 1792 at age 52, Gibbs lived up to the bargain and buried his wife with Shepard.

**Col. William Thomson**, Beaufort’s highest ranking officer in the Revolutionary War, is buried in a grave marked by a simple stone. Born in 1732, the same year as George Washington, he lived until 1802. Thomson was part of a militia that fought the British in the Charleston area, and he was

instrumental in getting state status for the North Carolina colony. Declared “the most influential merchant of his day,” he served the town, county and province in many offices and was a delegate to the Convention at Hillsborough and to the Provisional Congress at Halifax.

**A.P.** died in 1756, the oldest legible date on a tombstone in the Old Burying Ground. The grave, however, isn’t the oldest there. The earliest records were kept by the Church of England. But during the American Revolution, some Anglicans loyal to King George III fled to Canada and took the cemetery records. A.P. is possibly Abigail Parker, child of Reuben and Jane Parker.

**Lafayette Leecraft** was a young doctor who died in 1864. His broken marker has two interesting stories. One is that Leecraft belonged to a doctors’ fraternity that dictated its members’

*Continued*



tombstones could not exceed a certain height. His did, so his fraternity brothers broke it off at the proper height. The other story is that Leecraft's family had the monument deliberately broken in half to symbolize that his life was cut short.

**Samuel Leffers** was an early schoolmaster who penned his own epitaph: "Praises on tombstones are but idly spent. A man's good name is his best monument." He revealed these words for the first time in a letter to his brother in 1806. He died 16 years later, having slightly revised the wording. His brother saw to it that the epitaph was carved on his tombstone. Leffers and his wife Sarah owned what is known today as the Leffers' House on the Beaufort Historical Association grounds. They also lived in the Hammock House, which is Beaufort's oldest dwelling.

**Abigail Willis**, who died in 1864, was the mother of four children, one of whom was killed when nearby Fort Macon was overrun by federal troops during the Civil War. Before her death, she made arrangements to call attention to herself from the grave with her epitaph, "Behold! It is I, Abigail!"

**William M. Thompson** drowned in 1875 and was buried on a September night. The whole town gathered and watched as the masons in their aprons and regalia moved about, making an eerie picture in the light of flickering lightwood torches. Nighttime burials were not unusual at the time.

**Capt. John Sabiston** is one of many ships' captains in the graveyard. Sabiston was in Charleston Harbor when he died, and his crew decided to bring him back to Beaufort (a two-day sail) for burial. Embalming wasn't practiced until the 1900s, so it was difficult to preserve a body for any length of time, especially in the summer. When the ship arrived, it was night. People gathered by the wharf as the captain's body was taken off the boat. They followed as it was taken on a bier through the dark streets to the graveyard and lowered into a readied grave.

**Capt. John Hill** sailed the seas

before he died in 1879. His son had an inscription cut into his stone that could well apply to others in the seaside graveyard: "The form that fills this silent grave once tossed on ocean's rolling wave. But in a port securely fast, he's



*A child's stone in Beaufort*

dropped his anchor here at last."

**Henry Gilbert** was one of many others whose lives were taken by the nearby sea. His tombstone tells just the facts. "Ordinary seaman, Drowned, June 1895."

Cedar Grove Cemetery in New Bern also has its share of people who lost their lives to the sea.

The tombstone of **Capt. Lewis Lee**, who died in 1855, reminds landlubbers of the seas' powers: "They that go down to the sea in ships, that do business in great waters, these see the works of the Lord and His wonders in the deep."

The tombstone of **John D. Hughes** tells the story of how he drowned in 1879 at age 24. "During the great storm at Beaufort, N.C. Striving to save the lives of others. Greater love hath no man than this. That a man lay down his life for his friends."

A memorial to **Thomas Green** places his death in 1850, but he actually died in 1852, says his great-great grandson John Green, a historic preservation consultant. Green captained the *Cassandra*, which sailed for Antigua with a load of lumber and never came back. Several ships are said to have been lost off the North Carolina coast that September in a hurricane.

When **Capt. Amos Wade** died on passage from London to New Bern in the early 1800s, he was buried at sea. His memorial lists the coordinates where his body was ceremoniously dumped overboard.

**William Gaston**, New Bern's most famous son, is also buried in Cedar Grove. His sarcophagus-shaped marker is one of the cemetery's most impressive early monuments. Among other distinctions, Gaston penned the words to our state song. He was a judge, a lawyer and a Catholic who championed religious freedom. Gaston was so popular, in fact, that he was elected to the state legislature and Congress, and he even served on the state Supreme Court despite being Catholic. At the time, Catholics were barred from holding public office. He died in 1844 at age 65.

In the Christ Church cemetery lies the grave of **James Green Jr.**, who died at age 46 in 1784. His tombstone says, "Reader, if you knew the man, remember his virtues." It goes on to list his accomplishments: Secretary Provincial Congress, Aug. 25, 1774; Halifax Declaration, April 12, 1776; and the First Constitution, Dec. 18, 1776.

And sadly, each of these graveyards is full of people who never lived long enough to make their mark in the world. Children died at a time when few medicinal remedies to disease were known. A Cedar Grove marker memorializes nine children of one couple, **George and Leah Allen**. None of the children, who died between 1862 and 1876, lived beyond the age of 9. Five of them died in a three-week period in 1876.

*The Old Burying Ground offers self-guided tours and tours by appointment. Call 919/728-5225. The cemetery is located on Ann Street in downtown Beaufort. Cedar Grove Cemetery is located on Queen Street in downtown New Bern. The Christ Episcopal Church is located nearby on Pollock Street.*

*If you want to read more about some of North Carolina's most interesting gravemarkers, check out Tarheel Tombstones & The Tales They Tell by Henry King. ■*



APR 4 1997

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With a little information about tombstones, you can learn some interesting things about a person — or a person's family — without reading the names, dates or epitaphs.

The gravemarker can speak volumes in its design.

In the mid- to late-1700s, a skull — or death's head — represented a negative, final attitude toward death. An unusual example of one can be found at the grave of Josiah Howard, "A young man of surprising ingenuity," who died in 1759 at age 22. He's buried at the Christ Episcopal Church graveyard in New Bern.

The skull was first used on tombstones by New England puritans to symbolize the body's mortality, says M. Ruth Little, an architectural historian and Raleigh-based consultant. In the 1700s, it would have been unseemly for a puritan to expect eternal life, and it would have been offensive for a gravestone to indicate that a person was going to heaven, she says. Such rewards had to be earned.

The trends in New England gravestone art extended into coastal North Carolina as people sent away for engraved markers. Because no stone was native to the coast, anyone who wanted a carved marker had to be wealthy enough to order it. Not until the 1830s did anyone in North Carolina carve tombstones commercially, Little says.

"Ordinary people didn't have stone markers in eastern North Carolina," she says. "They were within the reach of a very small percentage of people."

The gloomy death's head — and views toward death — continued to evolve in the 1700s. Wings were added to the skull to symbolize a heaven-bound soul.

## What Can You Read From a Tombstone?

By Jeannie Faris Norris



A cherub eventually replaced the death's head in the late-1700s. The cherubic face still had wings at the ears, and it represented a more hopeful, religious view toward death and resurrection. It can be found in the older cemeteries, including Christ Church and the Old Burying Ground. Epitaphs of the time began to speak of going home, going to a reward and reuniting with God.

"The symbolism became hopeful," Little says. "The skull got flesh. At that time, the death rate was declining. Death wasn't as present in people's lives."

A heavenly reward was also represented by a hand with an upward-pointed finger.

The urn was a secular sign that appeared in the early 19th century and reflected a neoclassical style of tombstone art. It borrowed from the ancient Roman tradition of cremating the body and placing the ashes in an urn. Eastern North Carolinians used the urn as a symbol of death, although they most certainly didn't know about or practice cremations at the time, says Bennett Moss, chairman of the Old Burying Ground Committee for the Beaufort Historical Association.

A shroud, often draped over an urn or an obelisk, and a weeping willow tree

were signs of mourning.

The lamb was a symbol for a child who had died.

A dove represented youthful innocence and a soul flying away.

And a tree or obelisk broken in half also represented a young life cut short.

Clasped hands represented a husband and wife, Moss says. They were always displayed with the husband's hand reaching beneath the wife's hand, he says. The handshake could also symbolize God welcoming a soul into heaven and promising eternal life, says Little.

An anchor could represent one of two things: that the deceased was a captain or a spiritual anchor for the family, says John Green, a historic preservation consultant in New Bern.

Confederate soldiers' graves are denoted by Maltese crosses and, in Cedar Grove, small square stones.

The cypress stakes were placed for people who did not import stone from New England in the late 1700s and 1800s.

A bricked grave with a large, rounded dome was a sign of affluence in the 1700s and early 1800s. The Old Burying Ground holds examples of these aboveground markers, which were used into the 1840s.

A brownstone or slate tombstone with little decorative art was probably erected in the 1700s. North Carolina doesn't have engraved stone markers prior to the mid-1750s, Little says.

Fine-grained white marble usually marked the grave of a wealthy person in the early 1800s. Granite began to replace marble in the early 1900s.

A grave that conspicuously omits a birth date or age might have contained the remains of a woman who didn't want her age known — even in death, Moss says. ■



# Signaling the Return of Spring

By Odile Fredericks

About mid-March along North Carolina's seaside shorelines, coastal waters begin to warm, plants spurt new growth, critters emerge from their winter dormancy, baby animals are born. A timeless cycle of renewal, birth and the perpetuation of life is repeated.

The warmth of the salty shallows stimulates the plankton to bloom, the first seed in the marine food chain, while brightening skies and longer days trigger reproductive hormones in sea creatures offshore. By March, waves of sea babies, such as brown shrimp, flounder and spot larvae, move with the tides and the currents into the estuaries. Near coastal inlets, rising spring temperatures awaken the blue crabs.

Shoreside, ospreys migrating from the tropics return to nests perched high atop telephone poles and channel markers. Gulls and terns make nests along deserted inlet shorelines and dredge-spoil islands. Black bears venture out with their winter-born cubs to forage for food while red wolves lie pregnant in their dens. Newborn river otters rest with their mothers in hollowed tree trunks.

"Generally, spring is a season of change and movement," says Lundie Spence, North Carolina Sea Grant's marine education specialist. "If you're a cold-blooded animal, such as an oyster or a crab, you didn't do much during the winter. You are dormant and slow. With warmth and more food, oysters, barnacles and crabs have more energy for reproduction.

"Warm-blooded animals, of course, tend to reproduce in the late winter and early spring so that their young mature

enough to survive during the following winter," Spence says.

Sporting their golden robes, prothonotary warblers migrate to North Carolina to nest in cavities and brighten the gray barks of trees like Christmas ornaments. They flee the tropics to seize the incredible flush of insects that comes with the leafing trees, says Mike Dunn, coordinator of teacher education for the N.C. State Museum of Natural Sciences in Raleigh.

"With the changing of the seasons, you have these bursts of populations, unlike in the tropics," he says. "These migrants can now take advantage of the abundant resources, because it takes so much extra food to raise their young."

For some fish species, such as flounder, a spring meal means a ride of a lifetime. The adults spawn offshore, laying their eggs near the warm Gulf Stream. Their larvae ride wind-driven currents toward North Carolina's inlets, where they arrive in time for the estuaries' spring buffet. They make the journey in 30 to 50 days, a tremendous distance for creatures that are less than an inch long, says Sea Grant researcher John Miller, a zoologist at North Carolina State University.

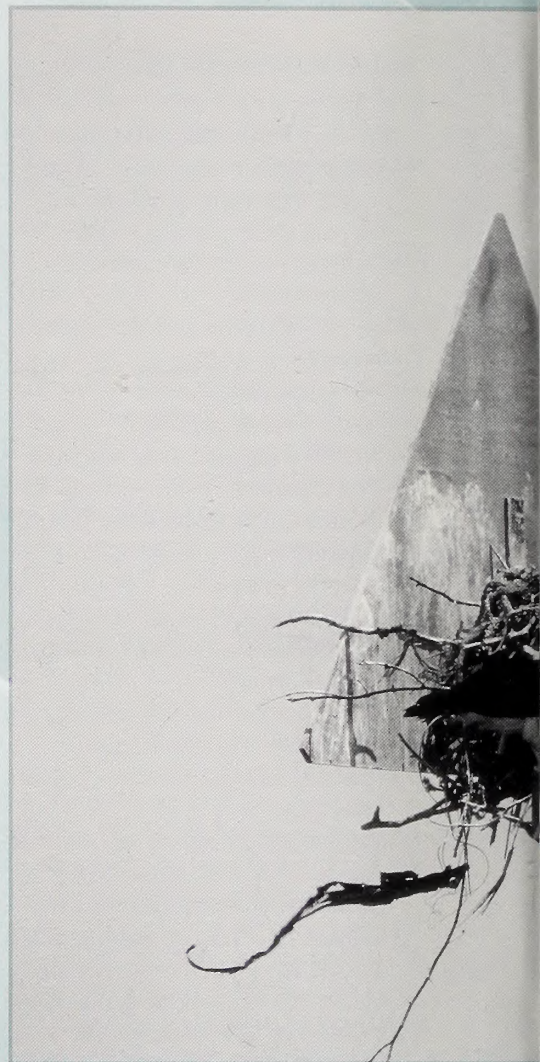
"That, in fact, is equivalent — if I scaled their bodies up to your size — to you swimming around the planet in 30 days," he says, noting that besides offering food, the shallow estuaries present young fish with a safe hide-away. "These estuarine waters are oftentimes muddy and dark-stained, and a lot of the predators are visually looking for prey."

The flounder babies spend their summer feeding in the estuaries, and by August, when they've reached about 6 to 8 inches and the food supply is dwindling, they may return to the ocean. In her lifetime, a female summer flounder will spawn 10 times, producing 5 million eggs, but on average only two of these will live to reproduce.

"More than 99 percent of these little babies die before they are a year old," Miller says. "They are playing a very long-shot game. If they were more successful, the population would be increasing like crazy."

Another well-known prolific producer is the blue crab.

When the waters begin to warm, female crabs arise from their sediment beds near coastal inlets and join males furiously feeding in the estuaries, getting







bigger to boost their chances of securing mates. After mating, the female migrates to the inlets carrying on her abdomen a bright orange sponge of 700,000 to more than 2 million eggs. By the time she arrives in late spring to early summer, the orange sponge has darkened to a brownish color. Then, on a night when the moon is hidden and the high tide begins to ebb, she releases her larvae into the ocean by slowly flexing her abdomen, says Sea Grant researcher David Eggleston, assistant professor of marine science at N.C. State University.

"As she does, you'll just see thousands and thousands and thousands of these little larvae start swimming out of these egg sacs, and the first thing they'll do is swim toward the surface of the ocean," he says. The ebbing tide carries them offshore, where they reside

for a month in the ocean, transforming into tadpolelike creatures that move back inshore through the inlets and usually settle in seagrass and shallow marsh habitats behind the Outer Banks.

Unlike the blue crab and summer flounder, which venture between offshore and inshore waters, the redbreast sunfish spends its whole life in creeks and streams, where warming waters urge it to spawn from April to June. After laying her eggs, the female takes off. The young hatch in nests built by their fathers, often in communities of other nesting fish near stumps and logs, says Fritz Rohde, biologist supervisor with the N.C. Division of Marine Fisheries in Wilmington.

"They probably remain in the same streams and in the same area and may use their same nests or nests used

by other sunfish," he says. "They lay eggs, and the male takes care of the nest till they hatch out, and then they're on their own."

As the redbreast sunfish bursts out of its egg, alone into its watery world, brown pelican babies in shrubs or thickets are pampered by their parents. Born naked, blind and helpless, the newborns require diligent care by both parents and do not achieve independence until they are almost 3 months old. Yet these babies grow into one of the world's largest birds, famed for diving headfirst from heights of 30 feet for fish, which they engulf in their pouches, pressing out as much as two gallons of water. As fledglings, however, they sit in their nests noisily calling for food as they await regurgitated fish from their parents.

In their haste to eat, chicks thrust their heads down their parents' throats, giving the impression the young are being swallowed whole. By the time they are ready to learn to fly, the average offspring has been so well fed it outweighs its parents. This fat helps the youngsters survive a grueling two-week maturation into adulthood as they learn to fly and fish on their own.

As the brown pelican builds its nest off the ground in thickets, the least tern, which usually begins nesting in May, lays on the bare sand, where its splotched eggs are almost invisible among the pebbles and seashells on the shore.

"On some of these islands, within only four or five acres, you just have thousands and thousands of birds nesting out there," says David Allen, coastal region nongame project leader for the N.C. Wildlife Resources Commission, noting that the islands' isolation from people and predators make them ideal spots for nesting.

While the dredge-spoil islands present havens for some birds, other creatures have been less fortunate in finding homes for their young. The piping plover and the loggerhead sea turtle need secluded beaches, which are

*Continued*



becoming increasingly hard to find. Beach development has diminished their territory.

"Not only has their habitat been taken over by houses and hotels, but even when birds or turtles find a place to nest, their nests often are disturbed by growing populations of humans and pets," Allen says, noting that the N.C. Wildlife Resources Commission this spring is researching why the numbers of nesting piping plovers is low in the state. The study will count nesting pairs in North Carolina south of Cape Lookout — where less is known about the bird because land is in private hands — and make recommendations.

The piping plover, which usually returns to where it last nested or was raised, is remarkable for the haste with which its young leave the nest. Born in a shallow depression lined with shell chips, pebbles or other debris, the chicks stay in the nest only long enough for their down to dry, then they hop onto the beach with their parents.

"Once the babies hatch, it's only a matter of several minutes to an hour at most till the young are off running around," Allen says. "They can't fly for some time, but they are running around quickly."

By the time the piping plovers have learned to soar in June, the mysterious loggerhead sea turtles have already begun crawling out of the ocean to lay their eggs on the beach. Weighing anywhere from 200 to 300 pounds, the female slowly makes her way from the water under the cover of darkness to nest at the base of sand dunes on the ocean-facing beach where she was born.

She digs a hole, deposits about 120 eggs the size of Ping-Pong balls, covers them and then returns to the water, a feat that takes 45 minutes to more than an hour, depending on the turtle's skill.

Each nesting season, she may lay

sex of each egg — cooler temperatures make more males, warmer ones result in females. No one knows for sure how many eggs actually survive to become mature sea turtles, but estimates range from one in every 5,000 to one in every

10,000, Boettcher says, noting that the loggerhead is threatened worldwide.

Although beach development has cut into the wide-open sandy spaces that the sea turtles need to ensure their eggs' safety, artificial lighting has also disoriented hatchlings on their way to the ocean. Other dangers come from ghost crabs, foxes and raccoons that find them delicious. Even when baby loggerheads reach the water, life is tough as "everything wants to eat them," Boettcher says.

Once they enter the water, they swim frenetically eastward until they reach the Gulf Stream, where, if they are lucky, they find a large floating raft of sargassum weed that harbors food and shelter. For several years, they float along with the current, eating and growing. No one knows exactly how long they wander, a period called the "lost years," before

returning to inhabit our coastal inshore and nearshore waters, weighing from 20 to more than 100 pounds.

Across the Coastal Plain, the reappearance of another species — this one endangered — is anticipated. North Carolina now has most of the remaining free-ranging red wolves in the United States, of which 90 percent are born wild.

Declared extinct in the wild in 1980, the last free red wolves were captured in Texas and Louisiana, bred



James Parnell



Bob Soots

four to six clutches, says Ruth Boettcher, North Carolina sea turtle project coordinator for the N.C. Wildlife Resources Commission.

"Once the female finishes covering up the nest, there is no more parenting — the female leaves the nest, and the hatchlings are left on their own to fend for themselves," she says.

After depositing her eggs, the female swims to foraging grounds somewhere off the Atlantic coast. Incubation temperatures determine the



in captivity and released in Tennessee, South Carolina and North Carolina. Since their release at Alligator River National Wildlife Refuge in 1987, the population has fanned out to Lake Mattamuskeet National Wildlife Refuge, Pocosin Lakes National Wildlife Refuge and surrounding lands accessed through agreement with land owners. These lands have witnessed the rebirth of the species, with 106 pups born in the wild by the end of last year.

"We couldn't ask for any more from the wolves — they're doing great," says Michael Morse, wildlife biologist for the U.S. Fish and Wildlife Service's Red Wolf Program at the Alligator River refuge.

Even as the wolf population grows, people are seeing less and less of the creatures as they revert to their natural shyness. Wary of humans, red wolves are considered social animals because they live in an extended family group. Born around May 1 with their eyes and ears closed, they are totally dependent on their mothers while nursing. At that tender age, they are constantly watched by a father, mother or other yearling.

By about six months, the pups start to explore their family's range — anywhere from 10,000 to 60,000 acres — and practice hunting, but remain dependent on their parents for food. Their sheltered existence comes to an end at 18 to 20 months of age, when they are dispersed by breeding adults that shun their offspring upon sexual maturity. Banished, many die as they struggle to feed themselves and find their own ranges.

Like the red wolf, the river otter pup can look forward to a sheltered infant sojourn, which is spent with its mother since males usually disappear after breeding.

Only 4 to 5 inches long at birth,

continue to develop for about two months, and then pups are born. As these offspring enter the world, their older siblings strike out, a phenomenon that helps the single mother cope with caring for her young.

Highly intelligent animals adept at seizing fishy prey, river otters have lots of time for play, which they relish. Living is easy for them even in winter because fish swim slower then and are easier to catch. Yet otters generally choose early spring to bear their young so that weaned pups can enjoy the clement breezes of May and June and their offerings.

"Spring birth gives them the advantage that when they are weaned, it's summertime and a lot more stuff is available, everything from tadpoles to crayfish or frogs," says Perry Sumner, furbearer project leader for the N.C. Wildlife Resources Commission. He has worked to reintroduce river otters to western North Carolina.

River otters disappeared from that part of the state by 1900 due to pollution of the rivers, erosion and siltation caused by timber harvesting, but they have always existed along the coast, Sumner

says. Today, the population is increasing along the coast and even inland because rivers are in better shape than they were 30 to 40 years ago, he says, adding that the existence of otters means that the ecosystem is "somewhat healthy."

If the birth of creatures like the otter is cause for celebration, it is also a mystery. No one knows exactly how a river otter disperses her offspring shortly before giving birth. Somehow she knows exactly how and when she needs to ready herself to care for new life. ■



*Alison Davis*



*Courtesy of the United States Marine Corps*

river otters are fully furred and look like tiny replicas of their parents, except for being blind and helpless. Their den might be a hollow tree or an old muskrat or beaver house with an underwater entrance, and they are usually born in early spring.

However, some pups arrive at other times because their mothers, who remate shortly after a pregnancy begins, can harbor fertilized eggs in a state of delayed implantation for as long as eight months. After this period, the eggs



# Up Against an Ocean of Odds

*Turtles are stranding in record numbers on the North Carolina coast. Scientists strive to understand why, and volunteers help collect the necessary data.*

*By Daun Daemon • Photos courtesy of Ruth Boettcher*

Even without humans complicating their lives, sea turtles have to beat some pretty hefty odds to reach a ripe old age. Greedy raccoons pillage their nests and feast on the eggs. Hatchlings that peck through to the world scramble to the ocean before ghost crabs and other land predators gobble them up. And once in the water, young turtles must elude predators such as hungry sharks that lurk there.

It's a life already fraught with dangers.

Add to it lost fishing gear and discarded plastics, nets meant for other creatures, pollutants discharged into the waters, rampant beach development, unavoidable encounters with recreational vehicles and even senseless cruelty — and a perilous future faces an animal that has quietly persevered for millions of years.

Most of the time, we humans don't see the evidence of those fatal impacts, but a number of sea turtles that die off our coasts each year will wash ashore. These strandings provide crucial data for the research biologists working to determine the health of turtle populations.

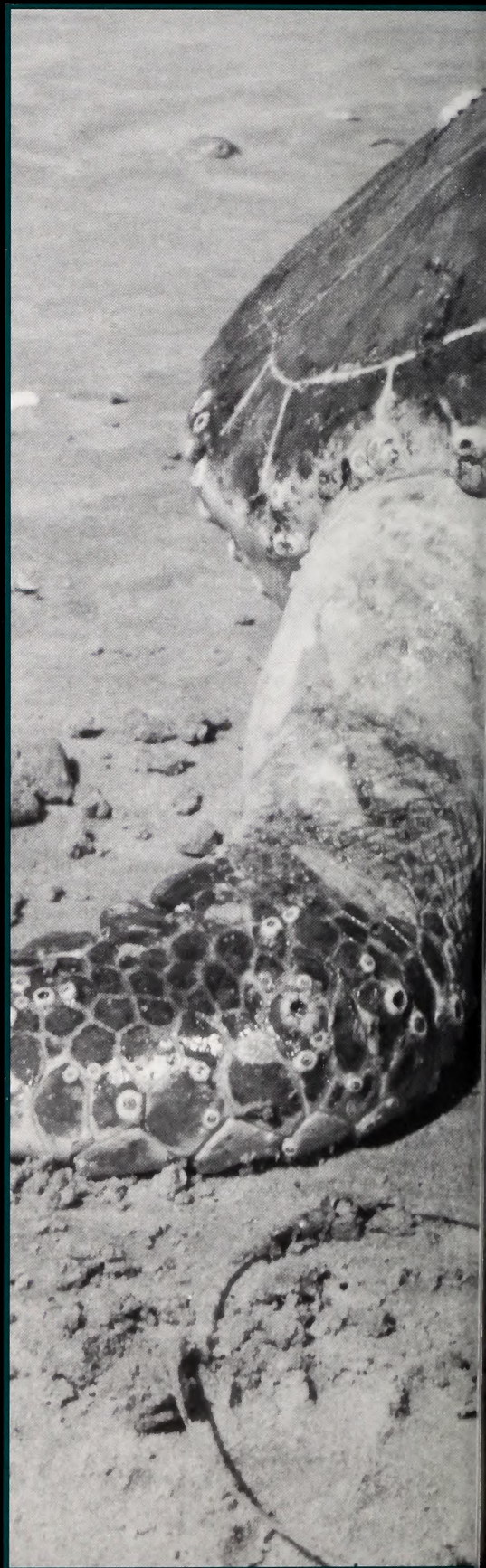
The number of turtles that stranded last year has put those biologists on alert. On North Carolina's coast alone, 503 sea turtles, mostly loggerheads, washed up dead or dying. From 1980 to 1994, the average number of strandings per year was 196, says Ruth Boettcher, the North Carolina coordinator for the Sea Turtle Stranding and Salvage Network.

"Keep in mind that during the first years the stranding network was in place, monitoring activity was low. As the network grew in size, the coverage of the beaches grew as well," Boettcher says, explaining that stranded turtles are more likely to be found with more people now monitoring the beaches.

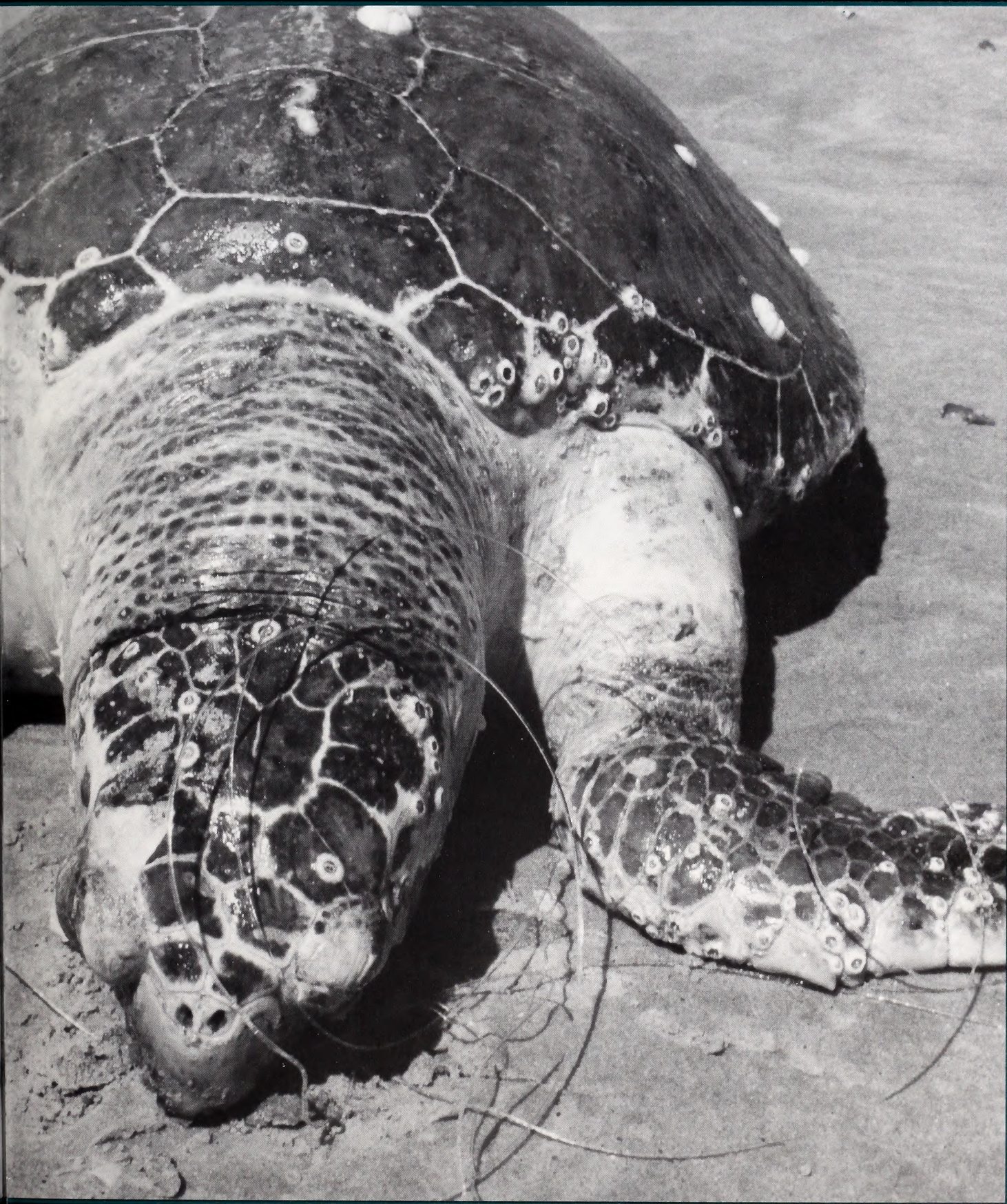
"Still," she adds, "503 strandings is incredibly high."

Along other coastlines, the trend is the same. Wendy Teas, the national coordinator for the Sea Turtle Stranding and Salvage Network, says that numbers are up in all regions, especially the Southeast (Georgia, South Carolina, North Carolina and the Atlantic coast of Florida). Two years ago, 1,377 turtles were found in this region.

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compared to 1,836 last year. Nationally, 2,824 turtles were found in 1995, and though all the data isn't in yet for 1996, Teas projects more than 3,000 strandings. Most of these occur on the East Coast; the water off the Pacific coast is generally too cold for turtles.

Why are strandings increasing? The hard answer to that question is that no one really knows.

## *Educated Guesses*

Some people maintain that strandings have increased because turtle populations are recovering — there are simply more turtles in the oceans now. But Boettcher says supporting this assertion is difficult, especially when so little is known about the turtles themselves.

"We're at a disadvantage because we don't have answers to many of the life history questions, such as how long the turtles live and when they reach maturity, so it's hard to form population models," Boettcher says. "We don't even know where all the nesting sites are in the world."

What is known is that a high juvenile mortality rate has a devastating effect on the entire population. With a high percentage of eggs and hatchlings taken by predators and with juveniles dying along our coasts, the chances for animals to reach maturity and reproduce grow slim. Without increased rates of successful reproduction, the populations can't grow. All of the ex-



perts agree that protecting nests and improving hatchlings' ability to get into the water is important. But even more crucial is reducing mortality at later life stages, especially among juveniles.

According to Boettcher, the turtles that strand in North Carolina are usually loggerheads, which find our coastline agreeable for nesting. The inshore waters provide crucial foraging grounds and shelter for young turtles.

"That's reflected in our stranding data," Boettcher says. "A large number of the stranded turtles here are juvenile loggerheads, and the majority of the other species found were juveniles as well."

In North Carolina, turtles are found offshore year-round and in inshore waters April through December. As in most animal populations, juveniles are the most abundant and therefore strand more frequently than adults.

Teas says that turtles killed more than five miles from land probably will not strand, so the mortality rates for turtles in open waters is unknown. And of the turtles dying in nearshore waters,

it is estimated that only a fraction will ever strand.

For the turtles that do beach, pinpointing the cause of death is difficult unless their bodies present obvious clues, such as propeller lacerations or plastic bags in their throats. According to Boettcher, members of the network can ascertain the probable cause of death in only about 20 percent of the strandings because the bod-

ies are usually too decomposed to give a clear reading. And most of the probable causes are "educated guesses," she says.

For example, when a turtle found during the winter months shows no visible cause of death, they assume that the animal probably was cold stunned, a fatal condition brought on by sudden and prolonged exposure to frigid water temperatures.

## *Nature's Toll*

Sheryan Epperly, a research fishery biologist with the National Marine Fisheries Service laboratory in Beaufort, believes that strandings in North Carolina were high last year due in part to two natural mortality events — mass strandings of turtles that presumably died from natural causes.

The first occurred in early May. Over the course of one week, 21 turtles were found between Nags Head and Hatteras Inlet. According to Boettcher, what killed the turtles remains a mystery.

The second event is equally puzzling for researchers. From the latter part of May until the end of June, 15 necrotic — clearly diseased — turtles were found



between Cape Lookout and Topsail Island and at Southport and Long Beach. All but one were loggerheads, the other, a green turtle. The animals bore sores and lesions on their skin and shells and carried extremely high numbers of barnacles, an indication of poor health. Some of the animals were so underweight that their undershells

were concave, a sign to Boettcher that they were sick for a very long time.

The turtles from both strandings were sent to the North Carolina State University College of Veterinary Medicine for analysis. Andy Stamper, a resident in zoological medicine, says the evidence doesn't support a human-related cause of death, but he also doesn't dismiss the possibility of toxic poisoning. Testing for pesticides or other pollutants in a turtle's body is complex and time-consuming, he says, and the levels that would be lethal for a sea turtle have not yet been fixed.

One effect that toxins could have on turtles is to compromise their immune systems, leaving them vulnerable to parasites they normally fend off. Also, a toxin may depress the immune system, thereby allowing bacteria to invade, Stamper says, and cause the kinds of symptoms found on the necrotic turtles. Finally, the animals could have traveled through areas affected by red tide or a similar phenomenon elsewhere and then, because their bodies incorporate toxins very slowly, suffered the effects when they came to



North Carolina waters.

"A lot of research needs to be done to determine the interactions of the environment and pollutants in the environment with the turtles," Stamper says. "It's very frustrating because everyone is concerned about the human interactions with sea turtles, and we haven't even determined all the natural causes of mortalities."

Another of those possible natural causes is a parasitic fluke. The turtles in both natural mortality events last year had flukes in their blood vessels, but it's unclear to Stamper whether that caused or contributed to the turtles' deaths.

### *Human Impacts*

Though natural causes can often be cryptic, human-related turtle mortalities — those in which an interaction between human and turtle has occurred — are more obvious. Humans dump their trash in the seas, trash such as plastic bags that a turtle will eat and that will clog its digestive tract. Deep wounds caused by propeller strikes as well as collisions with boats often re-

sult in death. Other activities that can kill turtles include dredging, mining, drilling and setting up underwater structures. Occasionally, turtles are killed in power plant water-intake systems.

And, for whatever inconceivable reason, people sometimes mutilate living turtles.

Of the ways people and turtles collide, those that involve recreational and

commercial fisheries are most controversial. Nets used by commercial fisheries can ensnare turtles, forcing the animals to stay underwater and drown. The animals can ingest hooks or become entangled in monofilament line discarded in inshore and offshore waters. Though researchers know that fisheries have an impact on turtle populations, Boettcher says the degree of the impact is still unclear.

Recent scientific studies indicate that turtle excluder devices (TEDs), escape routes for turtles built into trawl nets, reduce mortalities from shrimp trawling if they are used properly and consistently. The compliance rate for TEDs in North Carolina is high, says Boettcher. Because a TED must be able to exclude at least 97 percent of turtles to be certified, mortalities from the shrimping industry are considerably lower than in pre-TED days.

But North Carolina is home to fishery activities other than shrimp trawling, and that fact makes it difficult to determine the impact of fisheries as a whole in this state, says Boettcher. The scien-

*Continued*



tific community simply doesn't know how the other fisheries factor into turtle mortalities.

For instance, researchers have anecdotal evidence that gill nets — which are used to catch trout, flounder, spot, croaker, striped bass and other species — kill turtles. But they have no definitive studies that prove gill nets are a significant problem.

Says Epperly, "We have seen fresh animals we knew were gill net caught, and we still couldn't see any physical signs on the animal that it had been in the gill net or that the net had caused the turtle's death."

That lack of physical evidence is one of the complicating factors of turtle conservation. Whether it's death by human activities or natural causes, definite clues are few. What is abundant, however, is concern for turtles no matter how they perish.

## Taking Time for Turtles

According to Boettcher, the Sea Turtle Stranding and Salvage Network — established in 1980 — is currently the only reliable source of information on turtle mortalities. For this reason, the network's main goals are to determine as accurately as possible the number of turtles washing ashore and to identify stranding hot spots and figure out why turtles wash up dead in those particular places. With this data, scientists can make stronger conclusions about mortality rates and population trends.

## Sea Turtle Strandings

Year	North Carolina <sup>1</sup>	Southeast <sup>2</sup>	Total U.S. <sup>2</sup>
1990	277	1,514	2,515
1991	129	958	1,656
1992	240	1,010	1,742
1993	197	873	1,786
1994	297	1,241	2,536
1995	347	1,377	2,824
1996	503	1,836	est. 3,000+

<sup>1</sup> Data from N.C. Wildlife Resources Commission

<sup>2</sup> Data from the Sea Turtle Stranding and Salvage Network

Under the auspices of the National Marine Fisheries Service, the network consists of governmental and nongovernmental agencies and numerous volunteers. The National Park Service, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, N.C. Division of Marine Fisheries, N.C. State University College of Veterinary Medicine and many others provide needed services for the network to accomplish its goals.

For example, the N.C. Division of Aquariums offers assistance with stranded live turtles that no one else is able to give.

"To date, the aquariums have graciously accepted the responsibility of rehabilitation despite the fact they do not receive financial assistance for holding debilitated turtles," Boettcher says. "To help relieve the aquariums of this burden, sea turtle volunteers on Topsail Island are establishing an on-site rehabilitation facility they hope to have running by this spring."

The North Carolina network cur-

handle sea turtles in a fashion strictly in compliance with the Endangered Species Act.

Stranding network participants report dead turtles, identify the species, take measurements, look for external flipper tags and carefully examine carcasses for visible injuries or abnormalities that may aid in determining the cause of death.

When they find live stranded turtles, they protect the animals from harassment, keep them wet and shaded, and help ensure their safe transport to one of North Carolina's three state aquariums for rehabilitation.

Stranding reports submitted by network members give Boettcher and Teas the data they need to calculate the number of strandings, when and where they occur, and whether there were any unusual clusters of strandings during the year.

Many network members also monitor and protect sea turtle nests but must perform these duties without dis-

*Continued on page 22*

rently has more than 300 participants patrolling the state's seaward and landward coastlines. After completing a training workshop, volunteers and government-run sea turtle protection projects are issued endangered species permits by the N.C. Wildlife Resources Commission. The permits allow individuals affiliated with these projects to

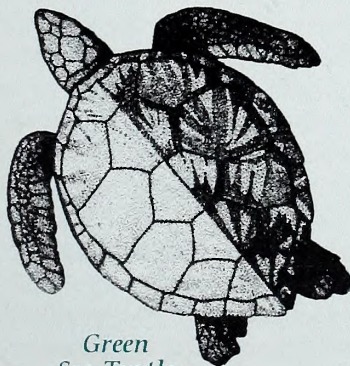


## Which Turtle Is It?

Relics of ages past, turtles look like scaled-down dinosaurs carrying mobile homes on their backs. Their body structures are unique in the animal kingdom — there's no mistaking a turtle for any other creature. But telling one species of turtle apart from another is a little more challenging. Below are distinguishing features of the five sea turtle species that can appear in North Carolina waters.\*

### Green Sea Turtle (*Chelonia mydas*)

- light to dark brown carapace with mottled, streaked or sunburst patterns
- heart-shaped shell
- small, rounded head
- two oblong scales between the eyes
- serrated jaws
- over-the-curve carapace length: 36-48 inches
- 250-450 pounds
- *status*: breeding populations in Florida and on the Pacific coast of Mexico are listed as endangered; all other populations are listed as threatened



Green  
Sea Turtle

### Hawksbill Sea Turtle (*Eretmochelys imbricata*)

- elongated yellowish-brown streaked carapace with deeply serrated margins
- overlapping scales on carapace and plastron (the undershell)
- hawklike beak
- over-the-curve carapace length: 30-35 inches
- 95-165 pounds
- *status*: endangered worldwide — extremely rare in North Carolina

### Kemp's Ridley Sea Turtle (*Lepidochelys kempi*)

- dull olive-gray carapace, round in shape with a low profile
- slender head
- scales covering the bridge connecting the carapace to the plastron are perforated by a single tiny pore
- over-the-curve carapace length: 23-27 inches
- 80-100 pounds
- *status*: endangered worldwide



Hawksbill  
Sea Turtle

### Leatherback Sea Turtle (*Dermochelys coriacea*)

- slender gray-black or blue-black scaleless carapace with seven distinct longitudinal ridges
- upper jaw has two toothlike projections
- no claws
- over-the-curve carapace length: 54-70 inches
- 650-2,000 pounds
- *status*: endangered worldwide



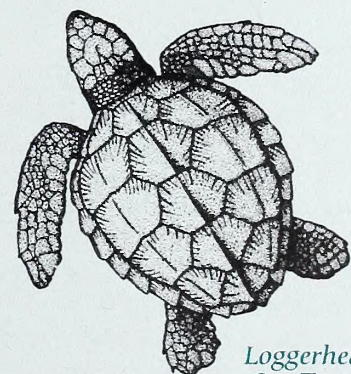
Leatherback  
Sea Turtle

### Loggerhead Sea Turtle (*Caretta caretta*)

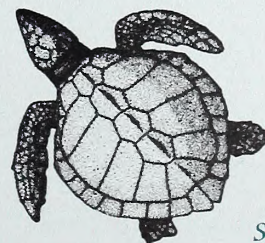
- heart-shaped, reddish-brown carapace
- large head relative to the body
- over-the-curve carapace length: 31-45 inches
- 170-350 pounds
- *status*: threatened worldwide — most abundant species in North Carolina

\* Size ranges for all species listed represent maximum adult sizes. Juveniles will be smaller. ■

Daun Daemon



Loggerhead  
Sea Turtle



Kemp's  
Ridley  
Sea Turtle



rupting the turtles' natural reproductive behavior. The tasks they carry out transform them into amateur field biologists: helping a disoriented female, who has just laid eggs, make her way safely back to the water; maintaining the proper level of sand over the nests and relocating nests jeopardized by human traffic, high tides or erosion; protecting hatchlings and taking measures to help them get to the water; and excavating hatched nests to recover trapped live hatchlings and determine the number of successfully hatched eggs.

Volunteers even control crowds that often gather to observe a hatching.

### *A Wish List for Turtles*

Members of the network know that their efforts are important to sea turtle conservation, but Boettcher and other scientists believe that more can be done.

To make necessary conclusions about all turtle populations, a more focused and coordinated international effort among researchers and governments is needed. Because turtles are global travelers, any progress made here is lost when they journey to other coun-

tries where they aren't protected.

Boettcher asserts that looking at the global turtle populations in new ways will be critical. Genetic studies, she says, point to separate populations rather than one large global population. If this is so, then conservationists will need to identify the various groups and design different strategies for each to improve their numbers.

Another issue to address is the relationship between turtle conservationists and commercial fisheries. "If people who spend time on the water every day reported sightings of stranded turtles in the water and on shorelines, then the data base would be enhanced and researchers would be better able to make population predictions," Boettcher says.

More help on land is important too. One of Boettcher's plans is to train volunteers in the stranding network to perform necropsies on the beach to rule out causes of death, such as plastic objects in the esophagus.

Because inshore strandings are underreported, Boettcher would like to recruit more volunteers to monitor inshore areas. Much of the shoreline is

accessible only by boat and consists largely of marsh, which makes finding these animals extremely difficult. She says there is little information on the number of turtles that wash up on the sound side of North Carolina's coast.

And it is possible for turtles to strand deep in these areas. A tagged corpse Boettcher and her colleagues released near Cedar Island was eventually discovered by a duck hunter in the marsh several miles away. It had drifted through shallow bays and creeks before stopping in its final resting place. That it was found was sheer luck, something Boettcher and other members of the stranding network hope to replace with diligent efforts to lower the odds. ■

*You can help researchers in their quest to understand turtle population dynamics by reporting stranded turtles to the local police or nearest aquarium or by calling 1-800/682-2632. If you would like to get involved in the Sea Turtle Stranding and Salvage Network or obtain information on any of the volunteer sea turtle protection projects in North Carolina, contact Boettcher at 919/729-1359.*

## The World on a Turtle's Back

Perhaps it is because they seem to us thoughtful, benevolent, wise.

Perhaps it is because they are so different from us — slow, cold-blooded, tough skinned.

Perhaps it is because their bloodlines extend millions of years beyond our own, reaching back through time to a world humans never knew.

Perhaps it is because they are wanderers that venture into the deep and cruise an unforgiving yet fantastic watery world we humans can only visit in brief jaunts.

Perhaps for these reasons we find sea turtles so mysterious.

In many cultures, the turtle is a symbol of longevity and endurance.

Ancient Asian, Greek and American Indian religions held turtles sacred, building ceremonies and legends around them.

Native American lore holds that an enormous turtle adrift in a primordial sea carried all the creatures of the world on its back before a world ever was.

And the ancient Hindus believed the Earth a hemisphere resting on the backs of four elephants who, in turn, rested atop the back of a great tortoise. Though the tortoise is a land creature, its seafaring cousins could probably support the planet just as ably.

They carry the world on their backs — and have done so for millennia — yet turtles are vulnerable to a soft-

skinned, shell-less animal with a taste for the sea. Turtles' stony carapaces and leathery skins are no match for strange contraptions, plastics and poisons. Their slow pace deadly in the path of swift boats and cruel people. Their ages-old habits of perpetuation thwarted by artificial lights and intrusive structures.

This vulnerability leaves turtles little room for survival — without intervention by the very creature in their way.

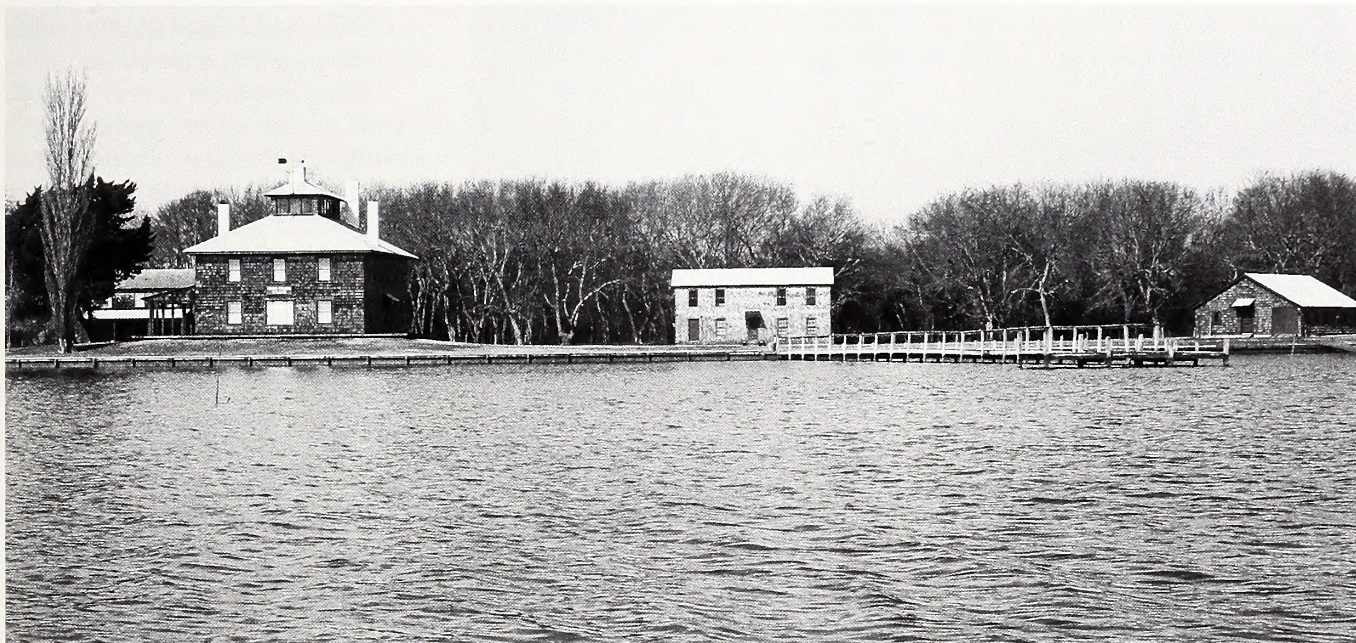
Perhaps it is because of this vulnerability and our own part in it that we should shoulder the world for a while and give the turtles a chance to rest and recover. ■

*Daum Daemon*



# Henry Ansell's Recollections of Knotts Island

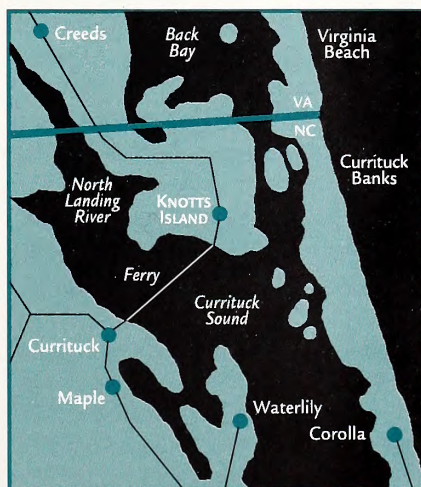
By David Cecelski • Photos by Tommy Lewark



*Hunt clubs have grown up around the area's abundance of waterfowl. These clubs are on Swan Island between Knotts Island and Currituck Banks.*

A nor'easter blew an icy mist across Currituck Sound when I visited Knotts Island recently. I walked along Great Marsh for hours and never saw another soul. Even the tundra swans and snow geese had retreated into thickets; I heard only a solitary marsh rail beckoning somewhere far off. A real tempest was blowing, but I hardly noticed: I had come to this remote peninsula between North Landing River and Currituck Sound, just south of Virginia, to mark the anniversary of a far worse storm that hit Knotts Island many, many years ago.

On March 6, 1846 — more than 150 years before my visit — the most wicked nor'easter of modern times hit Knotts Island. Descending from the North Atlantic in bone-chilling fury, the storm drove snowy gray breakers across Currituck Banks and into Knotts Island.



Fish camps and gunners' homes disappeared under the waves. Dunes and forests vanished overnight. Mariners caught at sea could only be pitied and, later, mourned.

A storm like that bears remembering. And, in truth, I had wanted to visit Knotts Island since I first read about the nor'easter of 1846 in Henry Beasley Ansell's *Recollections of a Life Time and More*. Born on Knotts Island in 1832, Ansell spent most of his life there and in Coinjock, on the mainland of Currituck County. Sometime around 1907, after he had retired as county surveyor and clerk of court, "the panorama of his birthplace passed ... before him," and he began to write the story of his boyhood years. Never published, his recollections are now preserved in the Southern Historical Collection of the University of North Carolina at Chapel Hill.

Before the hurricane of 1828 closed New Currituck Inlet, Knotts Island had been a busy maritime community, one

*Continued*





*Wooden decoys carved by Knotts Islanders are part of the local heritage.*

linked by the inlet to foreign ports and their ways. "Sailors from North and South met here," Ansell recalls his elders telling him. Cut off from the sea, Knotts Island languished as Currituck Sound went from saltwater to freshwater sea. The salt marshes died, the great oyster beds vanished, the mullet and flounder disappeared. And without a navigable inlet, Knotts Island was suddenly a lonely backwater.

During Ansell's boyhood, a new, more reclusive economy haltingly unfolded at Knotts Island. Thick growths of freshwater grasses gradually blanketed Currituck Sound. The tender grasses attracted huge flocks of migratory ducks and geese, and waterfowl gunning, not maritime trade or commercial fishing, became Currituck's major industry.

The nor'easter of 1846 hit when Knotts Islanders had just adjusted to the ecological upheaval caused by the 1826 hurricane. They had adapted to it with grace and ingenuity. Led by local gunners Wilson Cooper and Timothy Bowden, they pioneered new ways of waterfowl hunting, including the wielding of better muskets, shooting in the air and the first local use of wooden

decoys. They shipped their prizes by the thousands to far-off cities. And if islanders no longer had oysters to harvest, they sent freshwater fish such as perch and chub to Norfolk's markets.

Then, in early March of 1846, a stiff breeze blew from the northeast, increasing bit by bit, every day for a week. "The wind still increased," Ansell remembers, "the old Atlantic was plunging on its shore with a mighty roar, as if a squadron of modern war ships were practicing their heavy artillery." When the storm finally reached its full strength, he goes on, "the creaking joints of the housetops and the roaring of the blast in the tall old trees, mingled with the ocean's roar, were appalling." Old-timers had not seen a storm like it since the American Revolution. Ansell never forgot how, in his words, "all stood aghast."

For a day and two nights, the winds blew with increasing rage. Then they shifted, just as hard, a bit more north, and snow began to fall. "The next morning found devastation complete — trees uprooted and in confusion; the earth strewn with limbs and boughs, and covered with three inches of snow," Ansell recalls.

The Knotts Islanders at last ventured warily into the dying gale. Ansell and his father walked down to the marshy freshwater bay between Knotts Island and Currituck Banks. "Such a sight," he writes, "was never seen before." Rising on a spring tide, the storm had buried Currituck Banks: "No marsh, no beach, nothing to be seen oceanward except a few tops of the large mounting sandhills." A stunned Ansell found that "the great salt waves were breaking at our feet."

Knotts Island had been devastated. Homes and fences were washed away. Graveyards were upturned. Great schools of chub perished when the ocean's waves rolled over the bay. Corpses of hogs, cattle and sheep bobbed in the surf.

As the islanders gathered by the bay, someone asked what had become of the only two families that lived directly across from Knotts Island at Currituck Banks. Cooper and Bowden, the two expert gunners, were native Knotts Islanders. They had moved to the banks to be closer to the waterfowling grounds. When the Knotts Islanders learned that the families were missing, they sent out a rescue party. Borrowing Col. John B. Jones's fishing boat, 13 volunteers ventured directly into the nor'easter's headwinds to find them. "With sturdy oars," Ansell writes, "these men rowed against waves and flood and gale over bay and marsh."

The rescue party discovered Cooper's house abandoned and drifting in a copse of live oaks. "Over to Bowden's they went," Ansell recounts, "and found his house anchored and tied to the surrounding live oaks, tumbling about, but being kept on its balance by many devices." The Coopers and Bowdens were crowded into a rooftop garret, and salt water lapped at the joists just below them. The panicked families boarded the fishing boat and returned to Knotts Island. Nobody would live on that part of Currituck Banks again for many years.

The nor'easter of 1846 affected Knotts Island's ecology long after the debris had been cleared, the dead livestock burned and the homes repaired. For one thing, the freshwater bay



between Knotts Island and Currituck Banks turned salty again, damaging the waterfowl feeding grounds and interrupting the freshwater fishing on which Knotts Islanders had come to rely. Dolphins, stingrays and small oysters even returned to local waters for a few years.

Great Marsh Bay suffered a different fate. The freshwater marsh separates Knotts Island from the mainland of Currituck County. Flooded by salt water, the freshwater grasses died off and the bay was left, in Ansell's words, "in drift, mire, mud and slime." The brackish pools of muddy water made an ideal breeding ground for mosquitoes. For years, Knotts Islanders cursed Great Bay's flooding for a plague of mosquito bites and mosquito-borne disease.

Knotts Islanders did not realize the nor'easter's greatest damage until the summer of 1846. With much of the island deforested in the 18th century for fuel and naval stores, they had long relied on the longleaf pine timber from a vast swampy tract of Great Marsh Bay. "When it came time for these trees to commence their summer's growth, they died," recalls Ansell, "together with all the firewood and rail timber on the adjacent knolls."

Six decades later, Ansell could still write of the storm's destruction of the longleaf forest: "From this loss the island to this day has not recovered, nor can it ever recover. This timber ... grew scarcer and scarcer as the years rolled on, and at present little can be found."

Out on Currituck Banks, the nor'easter had flattened the sand dunes and ridges. From beneath the sand, Ansell remembers, "appeared, to the great wonder of the young, a large thicket of dead cedars, whose gigantic arms stretched impressively heavenward." (Such "ghost forests" are caused by wind-driven dunes that migrate over maritime forests.) His uncle Johnny Beasley recalled how he had boiled salt under their boughs during the War of 1812, screened from



*A watery view of Knotts Island*

the view of the British ships by their thick foliage. After the storm, he recovered salt pans that had been buried by sand for 30 years. Other islanders dug out the ghost cedars and sold them for vessel timbers.

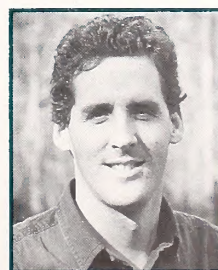
Things only got worse that fall. Another storm, a vicious hurricane, hit Knotts Island in September of 1846. Best remembered today for opening Hatteras and Oregon inlets, the hurricane struck Knotts Island when gardens and fields were brimming with produce. According to Ansell, "the few cattle and hogs" left after the nor'easter "were swept away as before." Many families must have gone hungry that winter.

I thought about Ansell and the nor'easter of 1846 as I left Great Marsh. Until hurricanes Bertha and Fran, many of us had forgotten how sudden, cataclysmic forces shape our coast. Mountains are pushed upward with staggering patience by slow tectonic grinding, an inch or two a year, until they reach the sky. But that has never been our coast's way of doing things. Disaster and upheaval are its lifeblood, just as much as sand and salt water. Ansell learned that lesson

150 years ago, and it is a lesson best not forgotten.

A cool drizzle descended on the state ferry back to Currituck. For a long time, I stood at the stern and watched the distant, crowded lights at Currituck Banks. That horizon would have been pitch dark a few years ago. Now it glows with condos, shopping centers and movie stars' homes. I couldn't help thinking that somewhere out in the North Atlantic a nor'easter is waiting to be born, a storm that will rival the one in 1846. It may hit Currituck Banks next year, in 10 years or in 150 years. But sooner or later, that sky will once again be just as dark as the night Ansell heard the Atlantic's waves pounding the shores of Knotts Island. ■

*David Cecelski is a historian at the University of North Carolina-Chapel Hill's Southern Oral History Program and a regular columnist for Coastwatch.*





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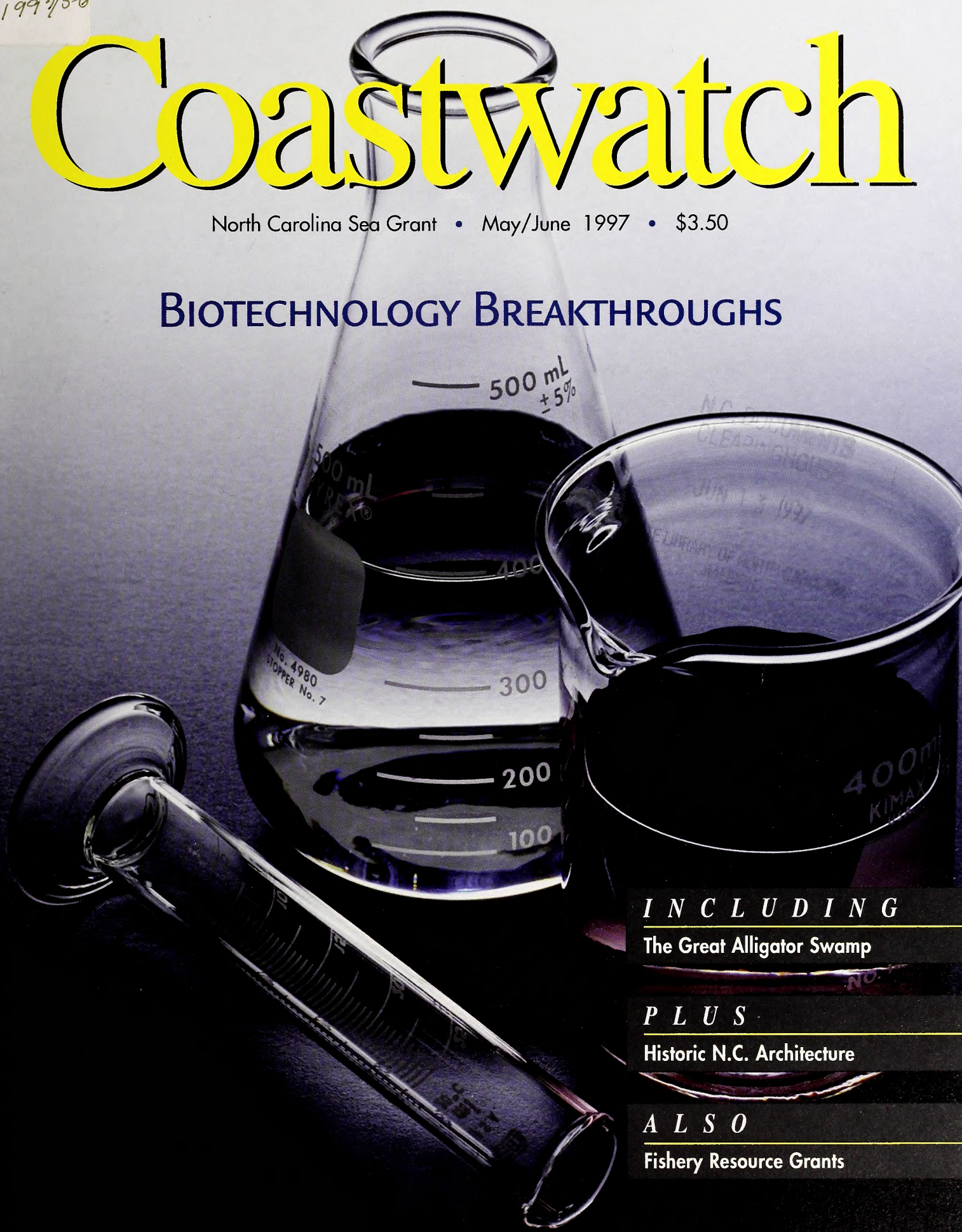


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# Coastwatch

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## BIOTECHNOLOGY BREAKTHROUGHS



### *I N C L U D I N G*

The Great Alligator Swamp

### *P L U S*

Historic N.C. Architecture

### *A L S O*

Fishery Resource Grants



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The North Carolina Sea Grant College Program is a federal/state program that promotes the wise use of our coastal and marine resources through research, extension and education. It joined the National Sea Grant College Network in 1970 as an institutional program. Six years later, it was designated a Sea Grant College. Today, North Carolina Sea Grant supports several research projects, a 12-member extension program and a communications staff. Ron Hodson is interim director. The program is funded by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration and the state through the University of North Carolina.

*Coastwatch* (ISSN 1068-784X) is published bimonthly, six times a year, for \$15 by the North Carolina Sea Grant College Program, Box 8605, N.C. State University, Raleigh, NC 27695-8605. Telephone: 919/515-2454. Fax: 919/515-7095. E-mail: [k\\_hart@ncsu.edu](mailto:k_hart@ncsu.edu). World Wide Web address: [http://www2.ncsu.edu/ncsu/CIL/sea\\_grant/index.html](http://www2.ncsu.edu/ncsu/CIL/sea_grant/index.html). Second-Class Postage paid at Raleigh, N.C.

POSTMASTER: Send address changes to *Coastwatch*, North Carolina Sea Grant, Box 8605, N.C. State University, Raleigh, NC 27695-8605.

*Front cover photo of some tools of the trade in biotechnology research.*

*Inside front cover photo of sea oats by Michael Kane.*

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## Features

### Solving the Mystery of *Pfiesteria*

*Pfiesteria piscicida* is becoming a household term in eastern North Carolina, where the toxic dinoflagellate has been linked to numerous fish kills in recent years. But the cryptic organism is difficult to detect in the environment, leaving folks wondering where and when it will bloom again. *Coastwatch* staffer Daun Daemon introduces readers to Parke Rublee, a Sea Grant scientist perfecting a gene probe that will uncover the microscopic menace where it lurks. .... 4

### Building a Better Sand Dune

Beaches of the Southeast could use a little shoring up after last year's storms flattened their dunes and washed away oceanside plants. In Florida, a Sea Grant scientist is working on a way to ease beachfront erosion. Horticulturist Michael Kane is "fingerprinting" the DNA of sea oats — those tenacious oceanfront plants that anchor moving sand — and identifying strains that grow best under certain conditions. *Coastwatch* staffer Jeannie Faris Norris takes readers to the Florida coast, where Kane's research will ultimately benefit commercial nurseries, regulators and perhaps even North Carolinians who want to restore their own dunes. .... 10

### Spawning New Ideas from an Oyster Shell

More than 15 years ago, South Carolina Sea Grant biochemist A.P. "Hap" Wheeler began to explore how oysters use proteins to regulate the size and shape of their shells. Now that research is paying off in product development that ranges from more biodegradable diapers to environmentally friendly laundry detergents. Sound unusual? Learn more about Wheeler's research as *Coastwatch* staffer Kathy Hart explains how oyster proteins may pave the way for biodegradable products in the future. .... 15

### A Historian's Coast:

#### In the Great Alligator Swamp

In the first decades of this century, a sawmill town thrived in the swampland west of Manteo. Buffalo City, according to the unpublished memoirs of Benjamin Nathan Basnight, was a rough-and-tumble town where workers were owned by the company store and vigilante justice ruled. Using Basnight's reminiscences as a guide, free-lance writer David Cecelski takes readers into the swampy wilderness and brings to life a bustling world of days gone by. .... 19

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Michael Kane

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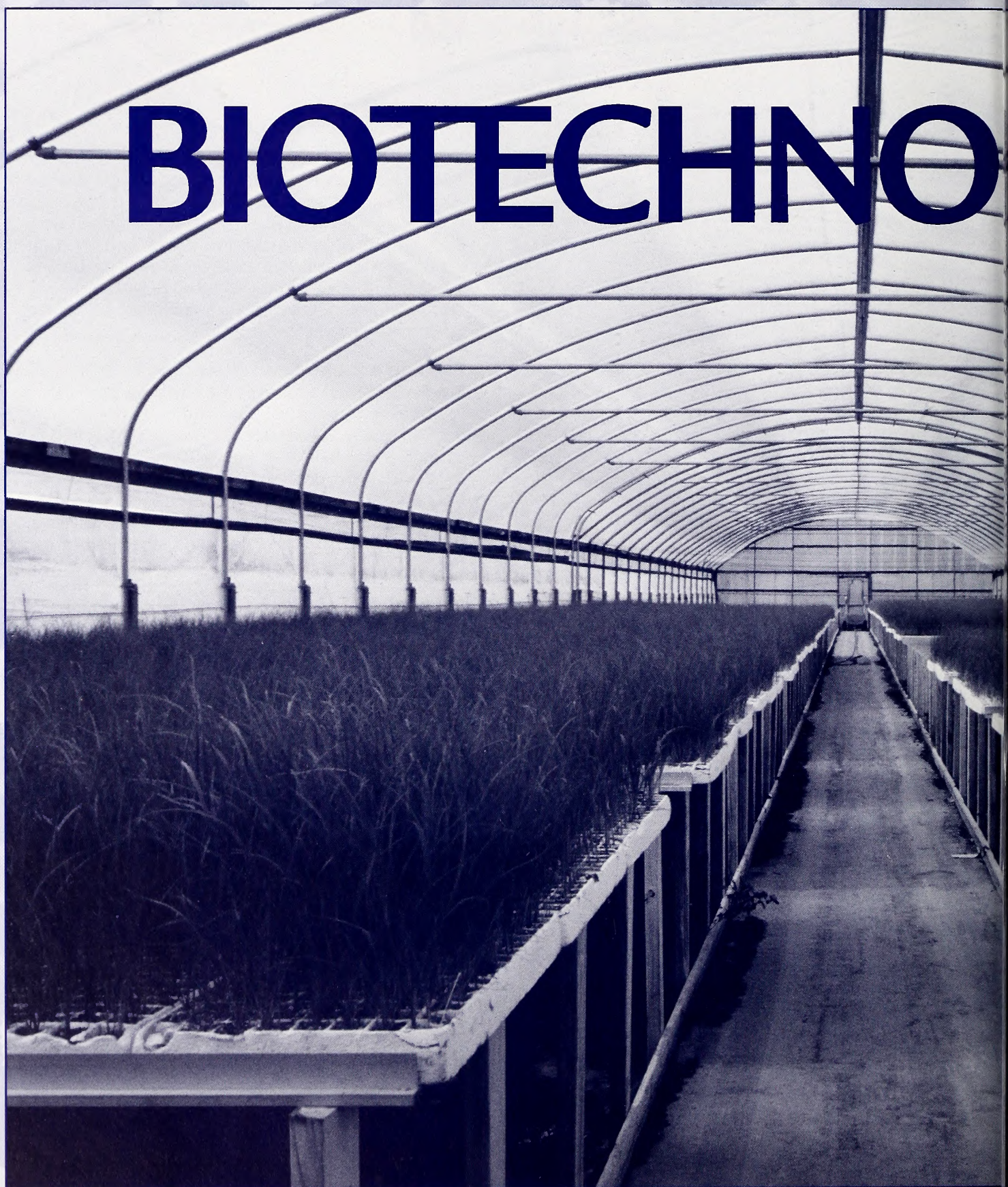


Herman Linkford

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# BIOTECHNO



Michael Kane

*Sea oat seedlings are grown to planting size in a Florida greenhouse.*





# LOGY

Say the word “biotechnology” these days and most folks think of Dolly the sheep and the public controversy whirling about cloning.

But biotechnology is more than just cloning.

It’s high-tech science, a relative newcomer on the research block. It encompasses everything from pharmaceutical development to bioremediation to DNA research.

Technically, biotechnology is defined as “using living organisms (or parts of organisms) to make or modify products, to improve plants or animals, to develop microorganisms for beneficial uses or to develop materials that mimic molecular structures of living organisms.”

Clearly, some of the most exciting scientific research in the world today occurs in this field. Of course, if it’s Sea Grant research, it’s marine biotechnology.

Sea Grant scientists explore the biochemical capabilities of marine organisms to develop new pharmaceuticals, chemical products, enzymes and industrial processes as well as vaccines, diagnostic tools, bioremediation techniques and genetically altered organisms for aquaculture and the seafood industry. Marine biotechnology also provides new tools and approaches to better understand ecological relationships among marine organisms and to help define fisheries stocks — information that will help improve marine resource management.

Currently, the National Sea Grant College Program funds 125 marine biotechnology projects at an average of \$100,000 per project. An estimated 20 to 25 percent of the projects have industrial matching funds or collaborators. Others have partners in resource management agencies.

This research advances science, trains students for careers in high technology and provides foundations for commercial development.

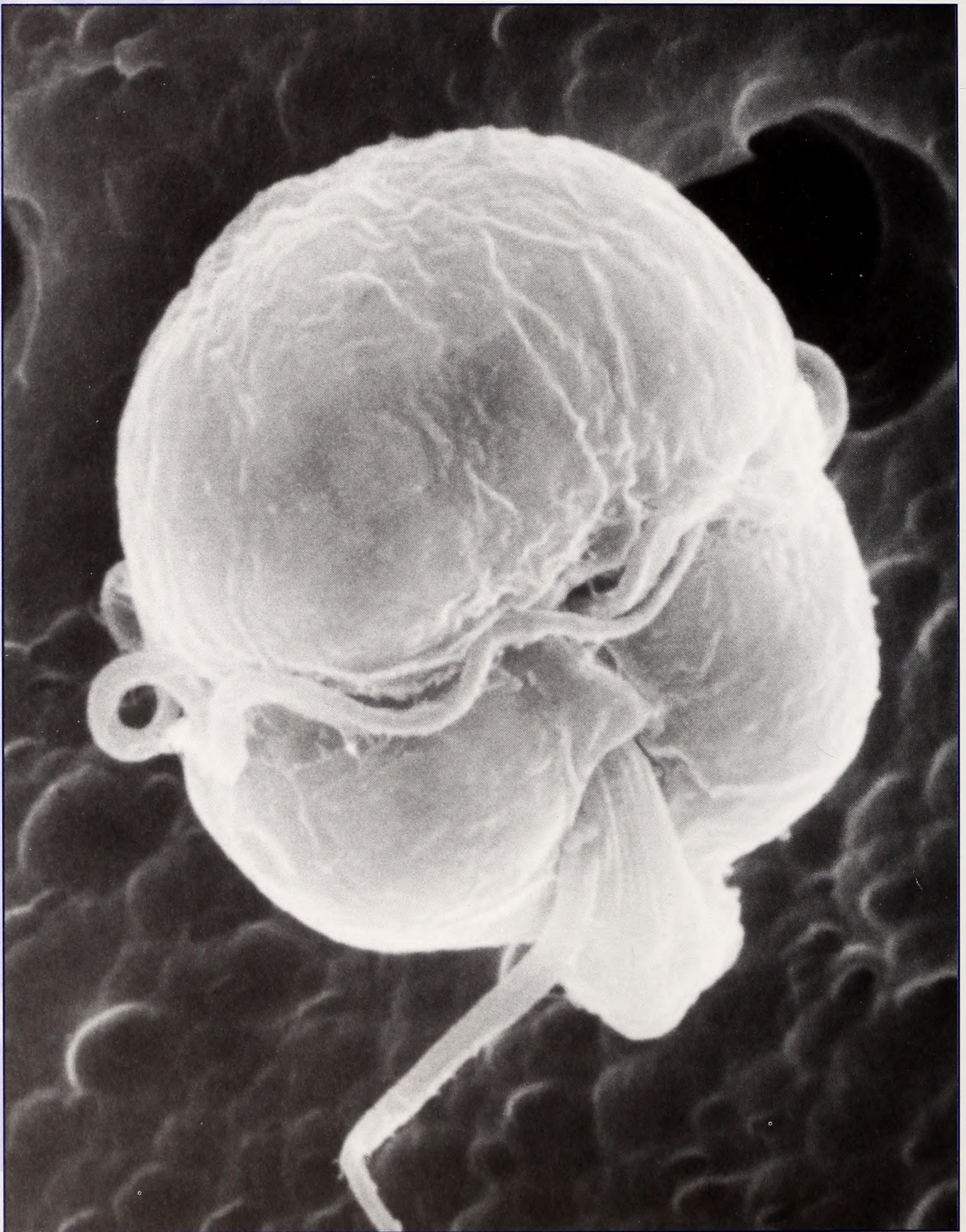
Recently, Sea Grant showcased some of its marine biotechnology research at a briefing in Washington, D.C., for journalists, policy-makers and congressional staff. This month, *Coastwatch* highlights three of the scientists who presented their work at the briefing.

- **Parke Rublee**, a North Carolina Sea Grant researcher and a biologist at the University of North Carolina at Greensboro, is developing a DNA probe to detect the toxic dinoflagellate *Pfiesteria piscicida* in the environment.

- **Michael Kane**, a Florida Sea Grant scientist and botanist at the University of Florida, is studying the DNA of sea oats to determine genetic diversity and survival traits. With this information, horticulturists can identify hardier, faster-growing strains for stabilizing dunes on the East and Gulf coasts.

- **A.P. “Hap” Wheeler**, a South Carolina Sea Grant Consortium scientist and biochemist at Clemson University, has developed a protein polymer analogue patterned after the proteins in oyster shells. Because the protein is biodegradable, it has widespread commercial application. ■





*Scanning electron micrograph of Pfiesteria piscicida*



# SOLVING THE MYSTERY OF *PFIESTERIA*

*A scientist in Greensboro probes for ways to track the toxic microscopic organism.*

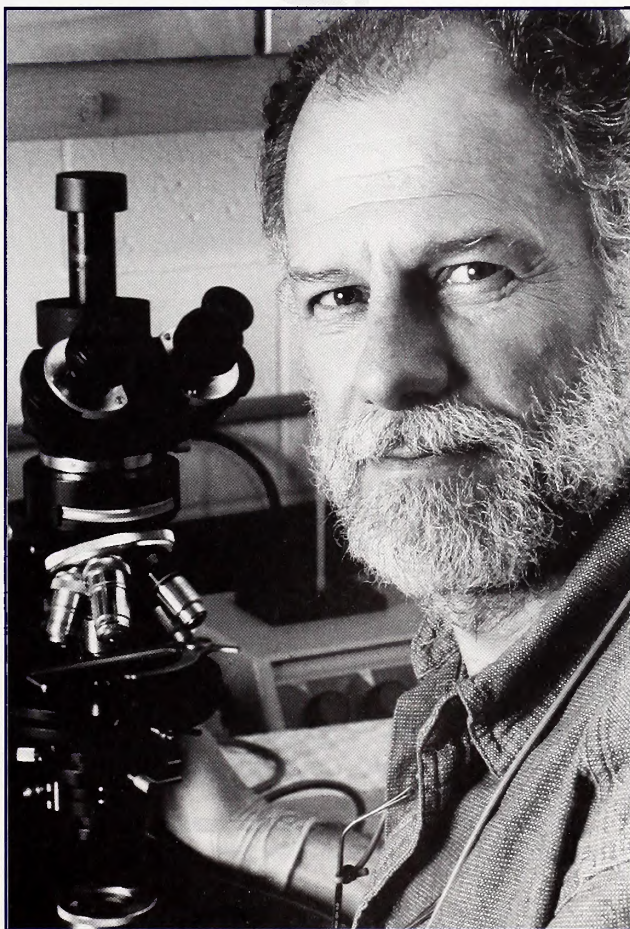
By Daun Daemon • Photographs by Herman Lankford

The suspect is elusive, a master of masquerade, a shape shifter capable of changing guises almost at a moment's notice. Although its identity has been known since 1991, understanding what makes it tick has proven a laborious task.

On the job are a number of persistent sleuths, all sniffing out clues that will help crack the case. With diligent effort, they sift through evidence, track down leads, put the squeeze on people who might have a tidbit of promising information, and work long hours making sense of it all.

Instead of trenchcoats and natty hats, though, these detectives wear blue jeans and lab coats. And the suspect they hope to detain isn't an underworld thug or a drug kingpin — it's a one-celled creature called *Pfiesteria piscicida*, which has been linked to more than 50 percent of the fish kills in North Carolina coastal waters in recent years.

One of the intrepid gumshoes on the case is Parke Rublee, an associate professor of biology at the University of North Carolina at Greensboro and a Sea Grant scientist. Rublee is developing a probe that will uncover the toxic dinoflagellate where it lurks in the environment.



*Taking a break from examining Pfiesteria cells under a microscope*

His quest is not as easy as it sounds because, as Rublee says, “there’s always a new surprise with *Pfiesteria*.

“It’s not necessarily unpredictable — as scientists we presume that we will know enough to be able to predict — but right now we don’t know

enough about this organism. We just don’t know what the rules are.”

What Rublee and his colleagues working on the enigmatic organism do know is that *Pfiesteria* is one of a kind, different from its red tide relatives in several ways.

Unlike red tide dinoflagellates, *Pfiesteria* does not signal its presence in the water. It lies in bottom sediments in a cyst stage until it senses approaching fish. It then transforms into a zoospore with a whiplike appendage, swims into the water column and releases toxins that directly or indirectly cause fish to slough their skin. The zoospore consumes pieces of the tissue and reproduces.

*Pfiesteria* neurotoxins also affect a fish’s nervous system, causing the animal to become disoriented and lethargic and to struggle for air at the water’s surface. With its breathing mechanism paralyzed, the fish will suffocate if it cannot escape.

As fish die, the dinoflagellate transforms back into a cyst within minutes to hours and sinks once again into the sediments.

Perhaps most vexing for those studying *Pfiesteria* is its ability to disguise itself. Scientists have identi-

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fied more than 23 different stages in the organism's life cycle, and most resemble other common, nontoxic dinoflagellates or even the sediments in which they lie.

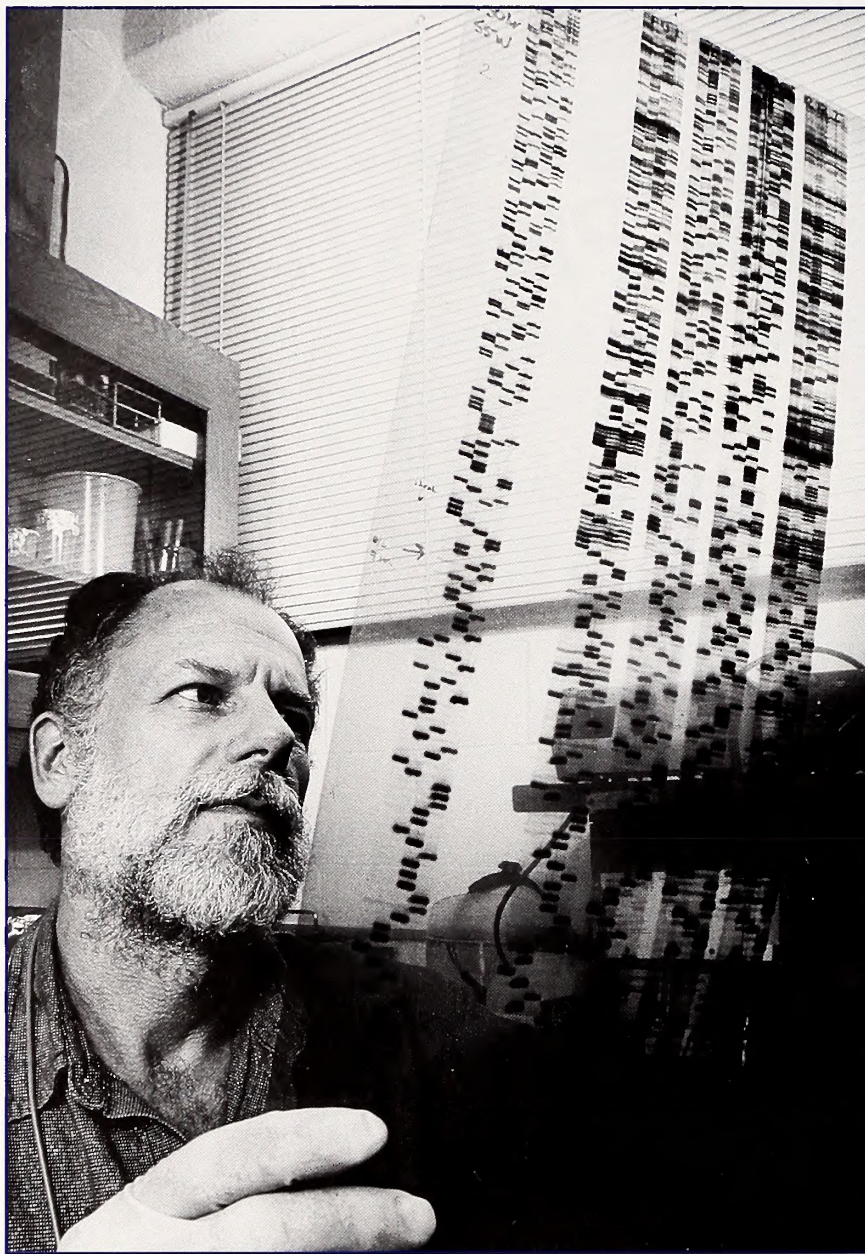
So how do scientists know whether *Pfiesteria* inhabits a particular river? The simple approach is to test water from that river. A test for *Pfiesteria*, however, is not so simple.

Currently, samples of water thought to harbor the dinoflagellate must be transported to a laboratory and the creature identified visually by researchers or technicians familiar with it. Even that can be a difficult task because the organism looks very similar to other dinoflagellates. A reliable test, then, would be a valuable tool in tracking down *Pfiesteria*.

The probe that Rublee and his graduate students are developing could be that tool.

## A Tough Nut to Crack

Fish kills seem worlds away from Rublee's office and laboratories on the UNC-Greensboro campus. From his cramped space lit by windows high above his desk, Rublee plans his work amid filing cabinets and shelves piled with books, papers and notebooks. The small laboratory just outside his office door holds a bewildering array



*Studying an autoradiograph of a sequencing gel to examine parts of a Pfiesteria gene that has been sequenced*

of all the standard scientific accoutrements: beakers, test tubes, plastic vials and canisters, capped bottles, microscopes.

The world of the dinoflagellate is under intense scrutiny here, and that work is anything but standard. The many unknowns about *Pfiesteria* have made the research almost maddening at times for Rublee and his cohorts, particularly his former graduate student Kristen Toffer.

"Kristen worked a long time

learning how to deal with the organism. We thought we were doing the right things, but we weren't getting very far, and that was frustrating," Rublee says. "It wasn't kick-the-wall frustration but darn-it-this-should-have-worked frustration. You wonder, so what do you do next? If it doesn't work, you step back and analyze why it didn't and ask, *should* it have worked?"

That approach is taken by countless researchers around the world every day, and Rublee and his team have become familiar with it. *Pfiesteria*, the scientist says, is "a tough nut to crack."

The nut Rublee is cracking is *Pfiesteria*'s genetic code — a successful probe depends on it.

To decipher the code, Rublee removes the DNA from a *Pfiesteria*

gene and replicates a long portion of it through a process called polymerase chain reaction, which Rublee describes as DNA replication in a test tube rather than a cell. Simply put, the DNA double helix is heated, breaking and separating the bonds of the single strand. Rublee then adds primers, synthesized pieces of DNA that match up with segments called conserved regions. These sections of a gene are virtually identical for all organisms and thus are well-known.

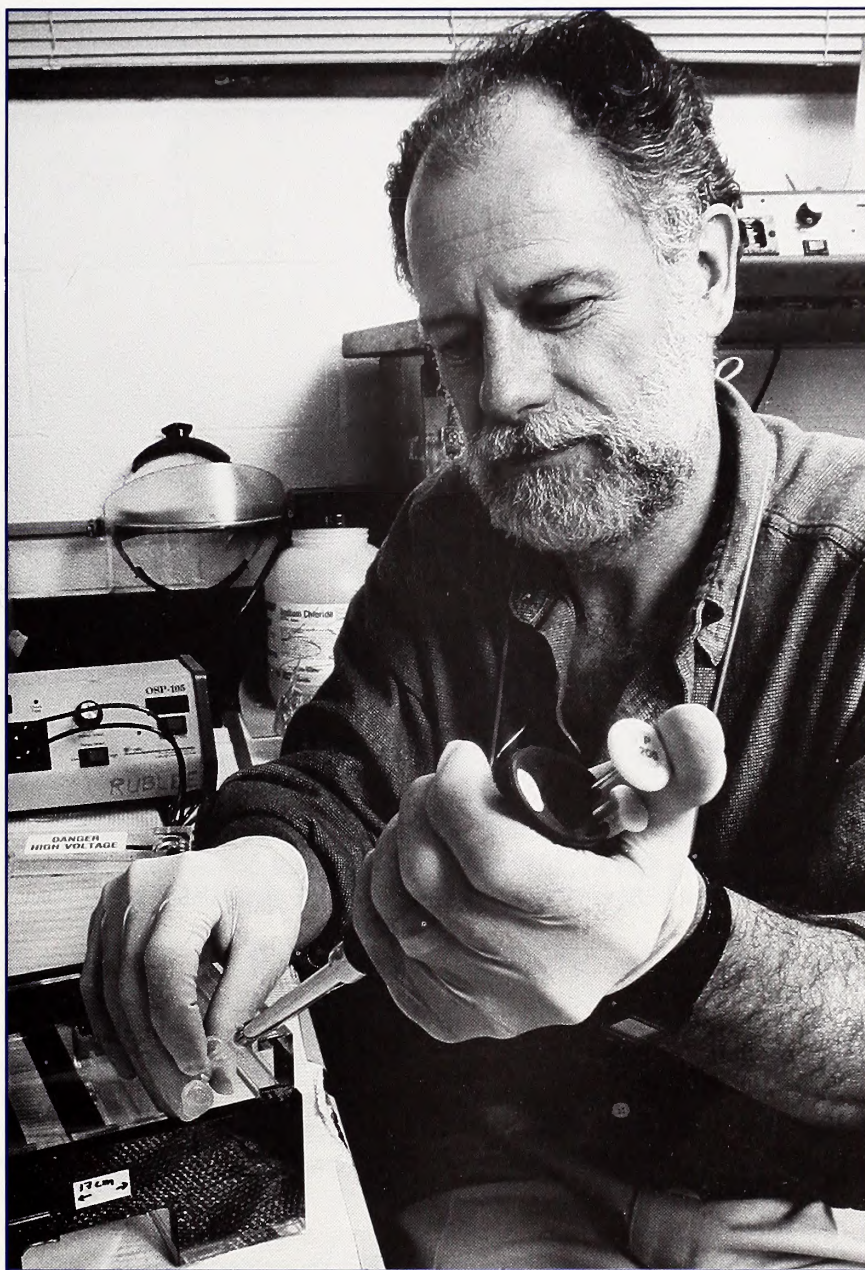


When the material is cooled, the primers reform bonds on the conserved regions broken during the heating process. Enzymes then begin building DNA on the new strand, which fills in the rest of the gene around the already matched conserved regions. These areas will be either semiconserved (with a degree of similarity in all organisms) or variable (unique for each organism). The end result is a copy of the original DNA.

This process is repeated 30 to 50 times, each time doubling the number of strands, to generate millions of copies. Rublee then looks at the sequences of these copies and compares them to sequences of other organisms similar to *Pfiesteria* to determine whether it is truly unique.

If it is unique, Rublee can design a probe complementary to it, a piece of synthesized DNA called an oligonucleotide that will seek out its complement on DNA extracted from waters or sediments where the suspect, *Pfiesteria*, may reside. If *Pfiesteria* is present, the oligonucleotide will bind to that target. If not, it won't.

The mystery isn't solved yet. Next, the scientists testing for the dinoflagellate must confirm that the binding has actually taken place.



*Loading an electrophoresis gel to check the results of polymerase chain reaction*

## Hitting the Target

One method to confirm binding is to use the probe as a primer in the polymerase chain reaction, which would yield many copies of the target if it is present. But certain chemical conditions have to be met for this procedure to work, and all the unknowns about *Pfiesteria* make that a chancy course to take.

A second method is blotting, chemically hooking another molecule to the probe so that it is larger and has

a marker attached. Rublee has blotted with a radioisotope but says that this method requires too many precautions.

"We want to use high tech to develop a low-tech method," he says.

So Rublee is focusing on fluorescence in situ hybridization (FISH), the detection strategy he calls "the coolest." Rather than binding to material extracted from the cell, the probe — equipped with a fluorescent marker — enters the cell and binds with the target material inside. The cell can be examined under a microscope after excess probe material has been washed away. If it glows, binding has occurred.

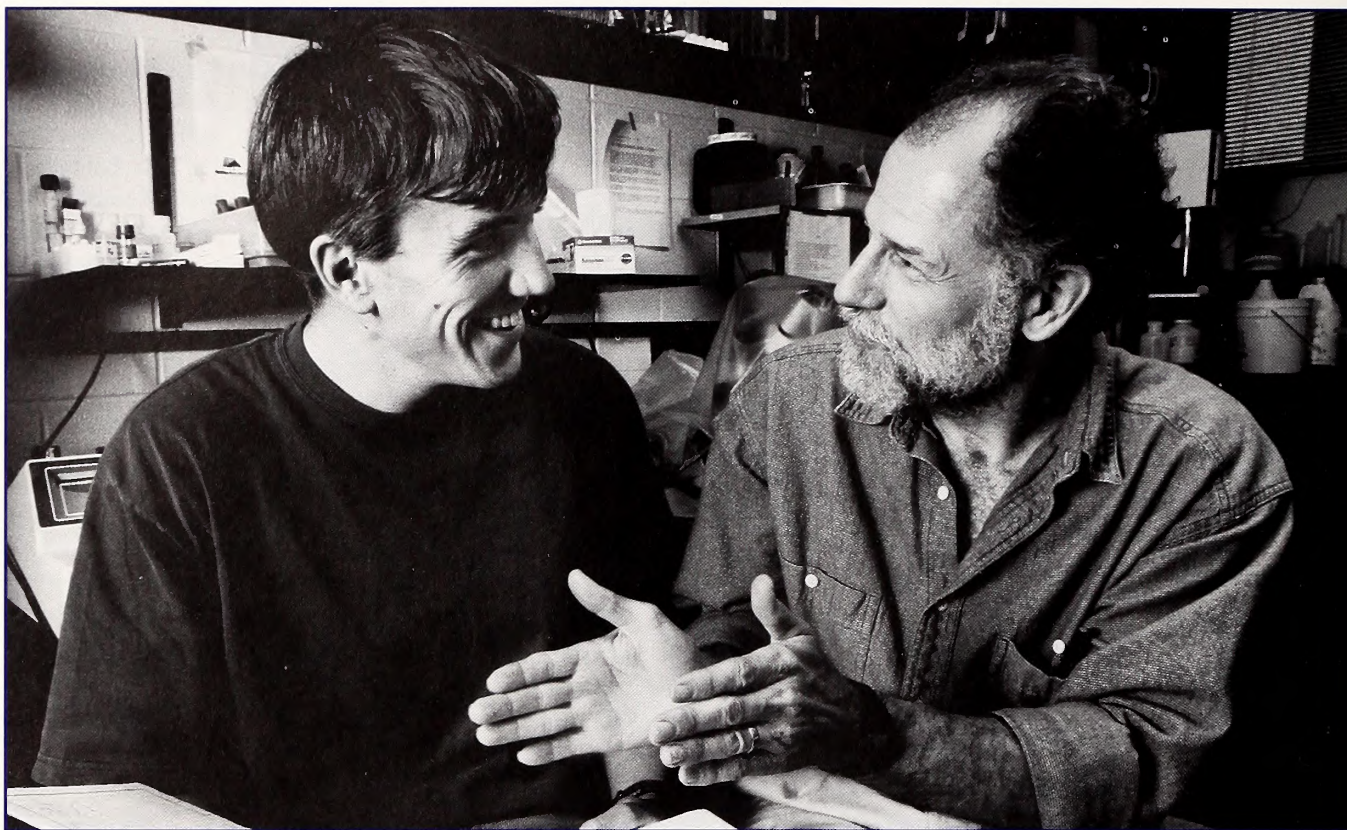
FISH requires minimal equipment and a few hours of time from sampling to results. With a power source and few chemicals on hand, it could be used to test waters on site.

But using this method on *Pfiesteria* poses a few thorny problems that Rublee is working to solve.

First, after consuming algae, *Pfiesteria* retains some of the natural fluorescence from the plant's chloroplasts. Also, the cell walls of the dinoflagellate itself fluoresce. These natural sources of fluorescence could interfere with the probe's effectiveness by masking the specific fluorescence from the probe. Rublee equates this to

*Continued*





*Discussing results with graduate student Jason Kempton, whose job is to refine field application of the gene probe to study *Pfiesteria*'s geographic distribution*

stars being obscured by a bright moon and city lights.

Also, breaking into the cells with the probe may prove difficult, Rublee says, because by nature the cyst resists intruders.

But the challenge is irresistible to this scientist, and he hopes to develop a probe that will penetrate *Pfiesteria*'s cyst form in the sediments, saving precious time and uncovering the organism before it can kill fish.

"We've been able to amplify [replicate DNA segments] from cysts in the lab, so we know we can break into the cyst cells. Whether we can on site, I'm skeptical," Rublee says.

Extracting DNA from cysts in the sediments and then probing it is another possibility. One of the first two methods described above – using the probe as a primer or blotting – could then be applied to test for binding. Rublee's graduate student Eric Schaefer is working on a method to extract *Pfiesteria* DNA from sediments.

## Investigative Teamwork

Rublee and his team have developed eight oligonucleotide probes that work to varying degrees on *Pfiesteria* in the laboratory. This success has taken years of patience, perseverance and — as the researcher selflessly points out — the input of countless other people.

For Rublee, an ecologist by training, the opportunity to work on *Pfiesteria* arose through his association with JoAnn Burkholder, the North Carolina State University aquatic botanist who first identified it in 1991. The two were working together on a different project at the time, but Rublee recognized the value a gene probe would have on the newfound dinoflagellate. The two researchers got funding from North Carolina Sea Grant and the Water Resources Research Institute and have worked since then to solve some of the organism's myriad mysteries.

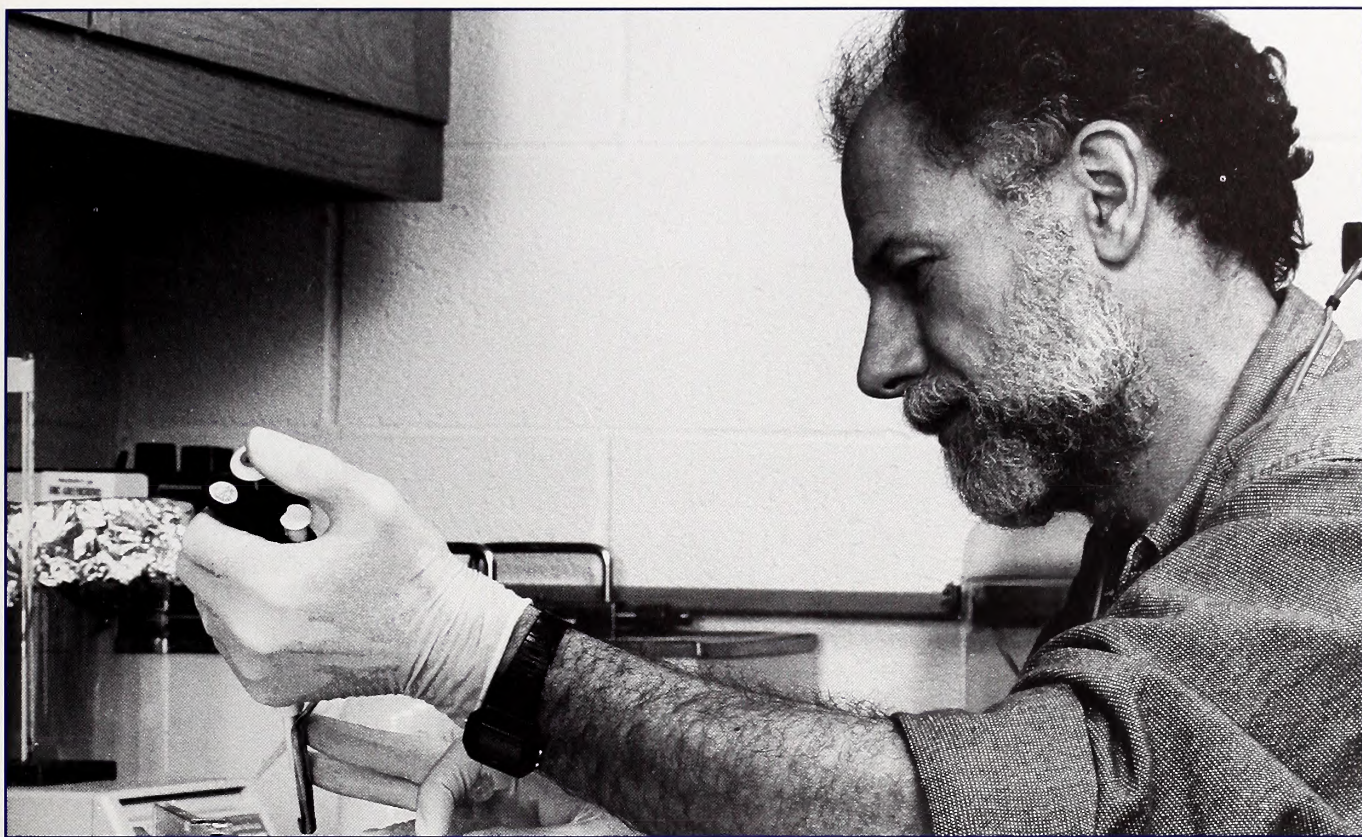
But this official collaboration is

not the only way scientists like Rublee pick one another's brains. He takes questions about molecular biology to members of his department, who then help him brainstorm and troubleshoot as they sip coffee or stroll down the hallways. And Rublee takes advantage of scientific meetings and the ease of electronic mail to consult with a wider base of knowledgeable folks, some of whom may impart that one bit of information that makes the proverbial light bulb flash in Rublee's head.

"A lot of informal communication transforms into real science," he says. "Science is a community effort, and I really think that the science that works best is that way."

Sometimes the contribution of other scientists raises more questions than it answers. Rublee recently consulted an expert in phylogeny about whether his assessment of where *Pfiesteria* sits on the evolutionary tree was accurate. The phylogeny expert concurred with Rublee's suspicion





*Working diligently with samples in the laboratory to create a gene probe useful for detecting the various forms of Pfiesteria in the environment*

that the organism sits in an unusual position, one different from other dinoflagellates.

Rublee's first thoughts were that he and his colleagues sequenced DNA from the wrong organism. Then the analytical thinking started, he says. "Is the organism unique, or did we pick a gene that will lead us off the track? I still don't know the answer, but as I continue to work with the organism I feel more confident that we haven't made an error in *Pfiesteria*'s phylogeny."

And even when he is led to success or confirmation of his predictions, the questioning doesn't stop.

"You get really excited for the next 24 hours," Rublee says. "There's a little mild euphoria, but not long after that you ask, why did we get it to work this time? Does it make sense that it worked? How do we get it to work again?"

## A Bigger Mystery to Solve

When it all works again and again and the pieces fit together, Rublee's understanding of *Pfiesteria* DNA will have far-reaching implications.

In addition to confirming *Pfiesteria*'s presence, the probes can be used to determine the dinoflagellate's distribution. This may help environmental managers devise strategies to reduce *Pfiesteria* and subsequently fish kills by controlling factors that encourage the organism's growth.

Preventing fish kills is important, but Rublee believes *Pfiesteria* is simply a clue in a larger mystery, one that may ultimately be more difficult to solve.

The organism may have lived in the shadows of our environment for millennia, only now emerging in force because it has been lured out by the right conditions.

"My sense at this point is that the frequency of *Pfiesteria*-related fish kills

is an indication of increased eutrophication of the coastal zone," Rublee says.

Eutrophic waters are those marked by excessive nutrients — a condition that encourages algae and other organisms to grow. Among the sources of these nutrients are urban and agricultural runoff, human and animal wastes, and industrial discharge. All of these contributors have become more prevalent in eastern North Carolina in the past few decades.

"Human impacts on the coastal zone are truly changing that environment, and sooner or later we have to decide what's an acceptable impact," Rublee says. He sees *Pfiesteria* as an indicator of a stressed ecosystem, and he doesn't see that stress easing anytime soon.

So until the tough issues of land use and environmental trade-offs are resolved, researchers such as Rublee will stay hot on *Pfiesteria*'s trail. ▀





Michael Kane

*Sebastian Inlet on Florida's Atlantic coast is one of four sites where sea oats were gathered for research. Test-plantings are scheduled for this location and others.*





# BUILDING A BETTER SAND DUNE

By Jeannie Faris Norris

Signs of last year's storms are still with us.

The hurricane season ended in a September tumult as Fran splintered homes, washed away docks and downed trees far inland from its Cape Fear landfall. Amid the ruin, it was easy to overlook damage to the coast's natural architecture, but the wreckage was no less complete.

Dunes were leveled into fairways of sand, stripped of their height and vegetation. The property and maritime plants behind them were left vulnerable to the destructive power of wind and waves.

Restoring the coast's flattened profile — its ruined dunes — will take some finesse. But research by a Florida Sea Grant scientist may eventually help repair damage from storms and the more gradual corrosive powers of shoreline development.

Michael Kane, an associate professor in the University of Florida's Environmental Horticulture Department, is examining sea oats (*Uniola paniculata*) in an effort to build a better sand dune. Specifically, he studies the genetic code of sea oats, cloned in a lab and grown in the field, to identify those plants best suited to stabilize sand dunes on Florida's Atlantic and Gulf coasts.

His findings may one day help North Carolinians restore their own shoreline stalwarts.

Sea oats grow on the United States' southeastern beaches, where they anchor the naturally shifting dunes. Their leaves trap wind-borne sand, and their roots hold the grains in place. Toughened by harsh coastal elements, these plants can tolerate frequent doses of saltwater spray and even brief inundation.

Kane's research into the hereditary hardiness of sea oats begins by studying their genetic makeup using a high-technology technique called DNA "fingerprinting." Like a human fingerprint, the DNA of each sea oat is unique. This process allows Kane to actually see a plant's genetic code and compare it to neighboring plants and to others hundreds of miles away.

The differences are summed up as "genetic diversity."

"When I say genetic diversity, I mean plants that are genetically different, which equates to different characteristics," Kane says. "A plant may be susceptible to certain diseases or have different growth rates. For example, if a plant grows slowly, it would be unsuitable where sand accumulates rapidly."

A plant community's microenvironment — the area where it grows — influences how its members develop. Certain characteristics allow these plants to thrive in one environment, but perhaps not another.

"Plants may have evolved to grow

*Continued*



well under certain conditions," Kane says. "And when they're moved, they wouldn't do as well. Or they may do too well. But with sea oats that wouldn't be a problem. That would be a nice thing."

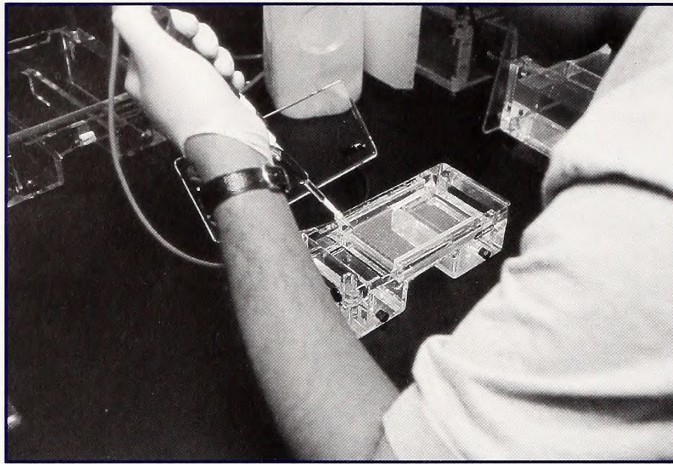
Knowing the genotypes that survive and stabilize the high-energy areas of Florida's panhandle, for instance, can help restore similarly unstable dunes elsewhere. Likewise, sea oats in North Carolina reflect the growing conditions and dune systems of their native beaches. Understanding their genetic differences will help screen plants from distinct geographical sources for their tolerance to certain conditions, Kane says.

## Who Can Use This Kind of Information?

Resource managers and commercial nurseries will benefit from the research. And, eventually, property owners and anyone who enjoys the aesthetics of dunes will gain from improved restoration techniques.

Once scientists have measured the genetic diversity among sea oats, they can help resource managers answer questions about the advisability of mixing and moving these plants to repair damaged dunes. The study can also identify genotypes that tolerate marginal conditions — a potential boon for commercial nurseries.

At the root of this project is the need for more and better plant materials. Recent storms in Florida have decimated sea oat populations,



*DNA analyses can tell researchers the range of genetic diversity among sea oats at one location and at sites hundreds of miles apart.*

Michael Kane



*Rooted sea oats are ready for the greenhouse, where they grow to about a foot tall before they're planted in the field.*

making it difficult for nurseries to get enough seeds for restoration.

"You can't get seed without a population," Kane says. "And you can't restore dunes without the seeds. So it's a double-edged sword."

As a rule, nurseries harvest seeds

from healthy dunes rather than pull up mature plants and move them to a damaged area. The seeds are germinated and grown to about a foot in height before they're placed on dunes. These plants are usually not cloned, but sometimes their shoot clusters are divided to make more plants.

Complicating the supply problems are some regulators' concerns about nurseries gathering seeds from dwindling natural stands and possibly introducing "unsuitable" genotypes to an area being restored.

"One of the concerns that has kept coming up is geographical source of sea oats," Kane says. "Is it ecologically sound to plant sea oats from the Atlantic Coast side on the Gulf side? This is raised as a concern."

Opposition to mixing genotypes of sea oats is not based on any proven fact that the practice can be a problem, Kane says. As of yet, regulators don't know how much diversity occurs naturally in a group of sea oats. And they don't have enough information to fully understand the relationships between geographic sources of plant materials, genetic diversity and successful habitat restoration.

Kane wants to supply that information through his research.

## Research is Rooting Out Genetic Diversity

How does Kane translate a plant's genetic code into a fingerprint? What is involved in distinguishing the DNA of seemingly homogeneous sea oats



and knowing which ones are best suited to grow in certain environments?

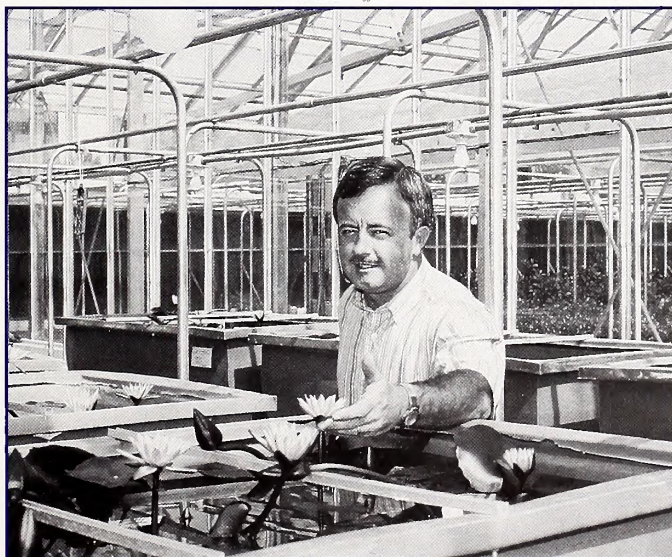
Kane begins in the field. Last fall, he harvested 100 plants from each of four sites on Florida's Atlantic and Gulf coasts: St. George Island State Park in Florida's panhandle, Egmont Key National Wildlife Refuge on the Gulf of Mexico near St. Petersburg, Sebastian Inlet on the Atlantic coast and Anastasia State Park, just south of Jacksonville. Samples are also being gathered from North Carolina beaches to compare the DNA of a distant population.

Next, in an extraction process that separates and purifies DNA from leaf tissue, Kane can look at its genetic blueprint. DNA is made up of units called bases. Primers (composed of about 10 bases) recognize and bind to complementary sites on the extracted DNA. Where the primers bind will be determined by the composition of the DNA. Kane copies the length of DNA between primer binding sites. These copies of DNA are separated and stained with a dye that usually fluoresces when bound to the DNA under ultraviolet light. Each DNA will produce a pattern of bands (the DNA fingerprint) in the presence of the primer. Each band is a genetic marker. Kane compares the DNA of different plants by noting the number of bands they have in common with a particular primer. To increase the number of markers being compared, he looks at seven to 10 primers. This way, he can see the variation among individuals and

## Sea Oats Collection/Field Sites



Bunnie Stafford



*Before beginning the sea oats research project, Kane made a name for himself micropropagating water lilies and freshwater wetland plants in his lab.*

populations.

Early results from three of the four sites show significant genetic difference within each site. In other

words, Kane doesn't have to travel 100 miles along the coast to find genetic variation among sea oats. The significance of this finding will be borne out in the growth trials, he says.

"We're seeing in fact what appears to be — but this must be confirmed — significant genetic variations," he says. "This tells us that plants are different. We can see genetic variability."

From there, based on what the DNA fingerprinting says about genetic variability, certain distinct sea oats will be cloned in the laboratory using a technique called micropropagation. Buds of the clones will be cultured into genetically identical shoots and grown out in a greenhouse, where differences in their growth rate and morphology (the form of the plant and its leaf, for instance) will be observed.

After growing for three to four months, the cloned sea oats will be taken to the four original collection sites and planted. These "reciprocal transplants" will test multiple copies of the plants at every site.

"We will evaluate them for growth, flowering, seed set and root development," Kane says. "We completely analyze the growth of each and how they grow differently."

When the research is completed in 1 1/2 to 2 years, Kane expects to have some answers to the questions that dog the Florida nursery industry and regulators.

And he hopes to build a better sand dune by understanding how sea oats adapt to certain beach conditions, wherever they may be. ■



## About Sea Oats

Sea oats are important to beaches because they help trap wind-blown sand and stabilize dunes for other plants to colonize. They are considered a pioneer species, which usually colonizes an area first, modifies the environment and then is succeeded by other species.

They get their name from the large plumes they produce in the summer. These plumes resemble those of oats.

The seeds on the plumes are dispersed primarily by the wind.

- **Ecological Functions**

Sea oats stabilize sand and provide a source of food and cover for birds and small mammals.

- **Distribution**

Sea oats live on coastal dunes from Virginia to Florida and Gulf states.

They are adapted to well-drained, sandy and calcareous soils.

Their resistance to erosion is good once they're established. Sea oats withstand wind erosion well, but waves wash the soil out from under them.

Their potential growth rate depends on environmental conditions and maintenance. The plants can grow laterally several feet per year. Once established, sea oats can provide dense cover in three growing seasons. They will flower in the second or third year.

- **Maintenance**

When planted, they should be watered if necessary for the first few months, depending on rainfall.

They should get 1 teaspoon per plant of a balanced, time release fertilizer when planted.

Exotic plants should be removed.

After sea oats have established, they should be clipped to produce more sprouts. ☐

## Making a Case for North Carolina Sea Oats

David Crews

For all of their sand-accumulating assets, sea oats are not used much to restore North Carolina dunes. These seaside sentries have fallen out of favor as planting materials because they're difficult to get in quantity and, consequently, they're expensive.

Most of the sea oats used to repair dunes locally are ordered from Florida nurseries, where they are grown out from seeds in greenhouses, says David Nash, an agricultural extension agent in Brunswick County. But Nash wants to bring sea oat production in-state by identifying a vigorous North Carolina strain of *Uniola paniculata* and finding a way to grow it commercially.

"I think there is going to be a real need for sea oats in North Carolina," he says. "And if sea oats become more widely planted here, people will begin asking for an indigenous strain."

Nash is building his doctoral thesis on this research, choosing the strongest North Carolina sea oats and planting them for observation along the state's southern shores. He's also studying Florida sea oats, planted alongside the native varieties, and comparing them for cold tolerance, among other traits.

"For years, plants have been selected on characteristics that are desirable," Nash says. "What we'll be looking at this year will be plants that produce a desirable trait. That could be seed production or rate of growth. And we'll take seeds from those plants, reproduce them, put the plants out and see what they do."

Most dune work in North Carolina is done now with American beachgrass, which can be grown in a field alongside soybeans and corn. One American beachgrass "mother" plant can produce 30 to 40 plants for sale, and a \$50



**Florida researchers want to limit foot traffic across their planting sites.**

investment will buy 1,000 of them. By contrast, sea oats cost 60 cents per plant, or \$600 for 1,000, because of their more labor-intensive upbringing.

Several varieties of American beachgrass do well in North Carolina, and

it's a good plant for the money and its dune-anchoring abilities. But the species is at the southernmost extent of its range, making it more susceptible to disease and die-off after four to five years, says Stephen Broome, a professor of soil science at North Carolina State University.

Mixing sea oats with American beachgrass and other dune vegetation is a good idea ecologically because a diversity of plants is better able to stabilize a dune than a single species. And sea oats are a hardier plant.

"The advantages of sea oats are that they're more persistent and they don't have the disease problems," Broome says.

Left on their own without plantings, damaged sand dunes do mend and rebuild themselves.

"We just manipulate the natural tendency to do that," Nash says. "Where there is native vegetation, a dune will start building. With more vegetation or barriers, you're creating an opportunity for a dune to build. Vegetation will begin to grow naturally, but it will take a lot longer."

The payoffs of a healthy dune system are evident in the aftermath of storms. The oceanfront homes that fared best in last year's hurricanes typically had intact dunes protecting them from the surge, Nash says.

"After a storm goes through, it becomes obvious," he says. "Vegetation might be a temporary barrier in a storm, but it might also be the barrier that saves your house." ☐



# SPAWNING NEW IDEAS FROM AN OYSTER

By Kathy Hart

**W**hat do the eastern oyster, dishwashing detergent and diapers have in common?

A protein polymer and South Carolina Sea Grant scientist A.P. "Hap" Wheeler, a Clemson University biologist.

More than 15 years ago, Wheeler began to research how oysters use proteins to regulate the size and shape of crystals that comprise their shells. Now that research has garnered the attention of big-name corporations developing biodegradable detergent additives, superabsorbents for diapers and soil additives to increase nutrient uptake by crops.

Wheeler, an easygoing scientist with boyish charm and a warm smile, matter-of-factly talks about his research and the complicated chemistry behind it, never offering an inkling that his work could spawn billions of dollars in sales for a protein analogue patterned after an oyster.

Like our teeth and bones, oyster shells are made of biominerals: composites of minerals, usually crystals, and protein polymers, chains of molecules with a repetitive structure. In particular, the oyster shell is composed of mineralized calcium bound by proteins containing polymers of an amino acid called aspartic acid.

Wheeler says these chains of aspartic acid, called polyaspartic acid,

*Continued*



A.P. "Hap" Wheeler in his Clemson University laboratory.

Photo courtesy of News Services Department, Clemson University



are distinctive because they possess multiple negative charges. In the oyster shell, it is hypothesized that the negatively charged polyaspartic proteins attract the positively charged calcium crystals, controlling their growth and shape.

"When we started studying the oysters, we thought those proteins containing polyaspartic acid initiated mineralization," Wheeler says. "But what we found in our lab tests was that it stopped it. We were more than a bit surprised."

Wheeler thinks that the protein polymer selectively adsorbs certain surfaces of the calcium crystals as they grow, thereby controlling the shape of the oyster shell.

After understanding that the proteins controlled mineralization, Wheeler and his colleague Steve Sikes of the University of South Alabama saw commercial applications for their findings. The protein could be used to reduce mineral growth in boilers, cooling towers, desalinators, and mining and offshore drilling operations. Currently, industries lose hours of valuable work time and spend millions of dollars preventing crusty mineral accumulation with nonbiodegradable products that are potentially harmful to the environment.

Polyaspartic acid offers a biodegradable alternative that controls

mineral buildup without environmental repercussions. Already, the oil companies are experimenting with the technology to reduce mineralization at offshore well sites.

However, proteins extracted from

To manufacture this analogue, they used thermal synthesis, an inexpensive heat process that produced a dry protein powder.

Polyaspartic acid can now be manufactured in quantities sufficient for commercial use.

Having tackled that problem, Wheeler began looking at other industrial uses for the protein analogue. Again, the protein's chemistry provided an answer.

Detergent manufacturers add polyanions — compounds that carry multiple negative charges — to their products to attract and hold dirt and mineral particles. The dirt then stays suspended in the wash water "instead of landing back on your clothes or dishes," Wheeler says.

The negatively charged polyaspartic acid can perform the same function as the commercial polyanions, and it is biodegradable to boot.

Polyaspartic acid has a carbon-nitrogen backbone that naturally occurring microbes — fungi, bacteria and microor-

ganisms — can attack and break down harmlessly. However, the dispersants currently added to detergents don't break down because they have a carbon-carbon backbone that isn't digestible by microbes. Instead, these compounds are released into the environment with every use of the

Herman Lankford



*Polyaspartic acid could make detergents like these more biodegradable.*

oyster shells couldn't be the source of the protein. The bivalves were neither cheap nor abundant enough to offer a consistent supply of the protein polymer for industrial use. Instead, Wheeler and his colleagues designed and synthesized a polyaspartic analogue that mimicked the oyster protein.



washer, dishwasher, bathtub and shower and discharged from wastewater treatment plants to collect in the water column and sediments of rivers and estuaries.

Polyaspartic's potential use as a detergent additive gained the attention of Procter and Gamble, a leading detergent manufacturer. Wanting to know more about this protein analogue, the detergent giant provided some additional funding for Wheeler's research.

Neither Procter and Gamble nor any other major company has added polyaspartic acid to its detergent formulas yet.

"It's a few years from being generally accepted in a product," Wheeler says. "It takes research, market analysis and test-marketing before a large detergent manufacturer changes its detergent formula. They have to know consumers will be happy with the product they put on the shelf."

Wheeler thinks that public pressure to improve environmental quality and product biodegradability will help spur polyaspartic's use as a detergent additive. But it is likely "a smaller, less conservative detergent company wanting to develop and market 'green' detergents will lead the way," he says.

Already, polyaspartic acid has commercial possibilities that could make it worth millions. Wheeler could

have rested on his laurels, retired to his laboratory and let industry do the rest.

But that's not Wheeler's way.

The Duke University graduate again took his research cue from the

keep the shell from becoming brittle. Cross-linked proteins perform the same function in our bones and teeth. Without these longer proteins, teeth, bones and the oyster shell would easily crumble and break.

Herman Linkford



*Polyaspartic acid could make diapers more biodegradable.*

oyster. Wheeler found that some protein polymers in the shell are cross-linked — linked to one another to make longer polymers. He and his graduate student Andy Mount showed that these polymers could absorb several times their weight in water. In the oyster, these cross-linked proteins

Wheeler and his colleagues decided to cross-link polyaspartic protein analogues, creating a longer, larger, heavier polymer with a "big, open weave." This bigger polymer imitates the oyster protein's absorbency characteristics, sopping up more than 80 times its weight in water and qualifying it as a superabsorbent.

Again, the polymer has potential for commercial use in disposable diapers and sanitary consumer goods. It is a thirsty absorbent with a unique advantage: biodegradability.

But a biodegradable superabsorbent would need to be coupled with other degradable diaper components. So the pressure is on to create such products and reduce the landfill space and health hazard created by billions of dirty diapers.

Meanwhile, researchers at Donlar Corp. in Bedford Park, Ill., have been studying

an unexpected use for the smaller polyaspartates. They learned that the polyaspartic analogue helps plants absorb nutrients from the soil. The increased nutrient uptake increases yields and lessens the time of maturation in crops such as cotton, corn, soybeans,

*Continued*



wheat and some vegetables. Thus farmers can use less fertilizer, save money, reduce runoff of fertilizer nutrients and protect water quality.

Donlar Corp., which was founded in 1990 as a result of the polyaspartic polymer technology, is marketing the analogue as an agricultural supplement and producing commercial quantities of it using the thermal synthesis process developed by Wheeler, Sikes and Donlar founder Larry Koskan. The company has invested several million dollars in this new technology, filed for 20 patents and begun construction of a new plant devoted to polymer production.

Another new company, Biotechtronix, was formed by Mount to produce and market the analytical instrumentation developed in the lab during the 15 years of polymer research. In addition to Donlar Corp., other companies — Procter and Gamble, Rohm and Haas, Bayer, Monsanto and Mitsubishi — have been granted more than 50 patents based on the use and synthesis of polyaspartic acid.

Recently, Wheeler's phone has been ringing as researchers call to discuss the use of the biodegradable protein analogue in a variety of applications. Donlar is exploring these possibilities for personal care products such as shampoo and conditioners.

In addition to corporate attention,

Wheeler also received recognition from the U.S. Environmental Protection Agency, winning President Clinton's Green Chemistry Challenge Award for his work with Donlar Corp. EPA officials found Wheeler's work

Carolina Sea Grant Consortium. "We recognized from the beginning that Hap's research had potential, we just didn't understand how much."

No wonder the dry-witted, soft-spoken scientist is garnering attention of corporate executives and the national news media. Wheeler has been interviewed by reporters from CNN, National Public Radio, the Scripps-Howard News Service, *USA Today*, *Science News*, *Chemical and Engineering News*, *New Scientist* and more. With each interview, he patiently explains his research, its chemistry and its applications, always graciously acknowledging Sea Grant's early investment and encouragement for his work.

Some days Wheeler's phone rings almost nonstop, and his frequent flier mileage is adding up faster than some folks can say polyaspartic acid. He shrugs off the attention, though, lapsing into a story about his latest family tribulation. The family stories, jokes and offhand quips are his way of sidestepping the limelight. He's a scientist without an

inflated view of himself.

But soon he's back to talk of his polymer.

"Hey, you should see this Bayer logo. It has a polyaspartic polymer emerging from an open oyster shell. Boy, that tells the story with one picture doesn't it? Jeepers, that's neat." ■



*Donlar Corp. has developed a soil additive that increases nutrient uptake in crops.*

significant "because this polymer is biodegradable and because water is the only byproduct created during production."

"There's no question that the biodegradability of this polymer makes it unique, applicable in a variety of products and worth billions of dollars," says Rick DeVoe, director of the South



# In the Great Alligator Swamp

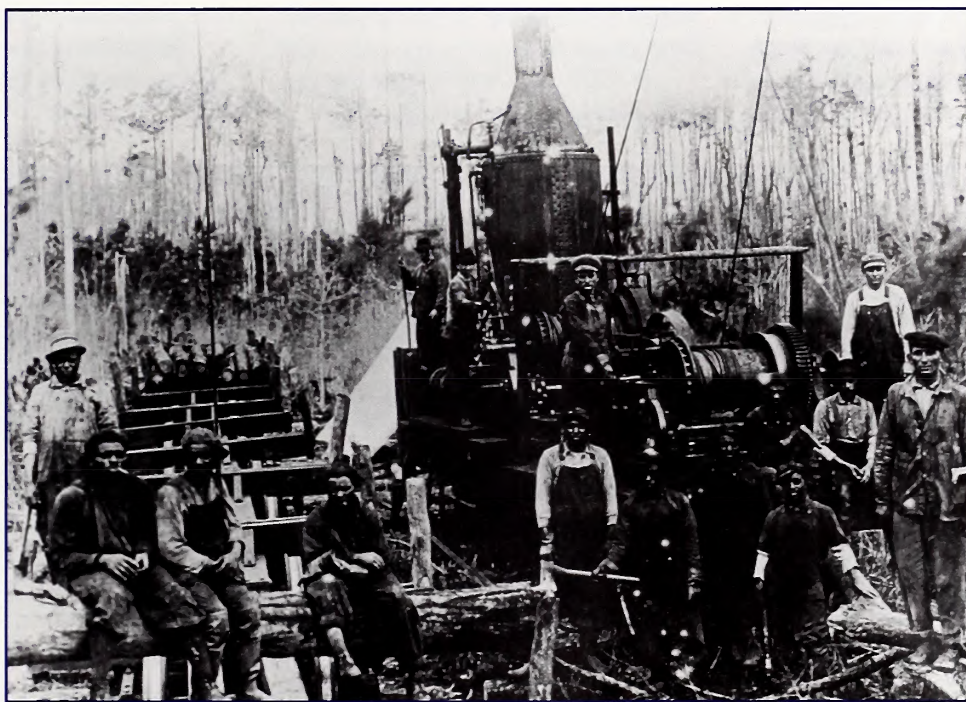
By David Cecelski • Photographs courtesy of the Hubert Ambrose Collection, Outer Banks History Center

Early this March, I disappeared into the Great Alligator Swamp.\* After being cooped up all winter, I needed to get into the wild. At the first hint of spring, I drove to the Alligator River National Wildlife Refuge, between Columbia and Manteo, and slipped my boat into an amber-red creek fragrant of peat

and sweet bay. Only in ancient peat swamps — the Dismal, the Croatan, the Okefenokee — have I ever smelled earth so uproariously rich in life. I loaded my boat with groceries, gear and extra clothes and paddled into the swamp, never looking back.

I picked the Great Alligator because it's such a grand wilderness, more than 160,000 acres of remote, uninhabited swamps, hammocks and lakes. But I also wanted to see what remained of Buffalo City. This abandoned sawmill village thrived by

*\* Historically, the vast swamp that covers most of mainland Dare and Tyrrell counties has been called by many different names, but I like "Great Alligator Swamp," a name used in the 18th century.*



*Skidder used by Dare Lumber Company and similar firms to haul trees to rail line*

Mill Tail Creek in the heart of the swamp between 1885 and 1925. It was once the largest town in Dare County and boasted one of the busiest sawmills in North Carolina.

Dozens of mill towns like Buffalo City sprang up in coastal North



Carolina between 1880 and 1920. American timber companies had exhausted the forests of New England and the Great Lakes, so they moved to the South. Soon they logged our old-growth forests and moved on too. When the last of the Atlantic white cedar (juniper) was cut, Buffalo City became a ghost town.

As I

paddled into the Great Alligator, I had a guidebook better than all of my topographical maps. My barber and friend Bud Midgette, who hails from Columbia in nearby Tyrrell County, had recently honored me with a copy of his late uncle's unpublished reminiscences. His uncle Benjamin Nathan Basnight worked at Buffalo City in the 1920s and lived all but a few years of his life around this swamp. At different times, he was a logger, farmer, fisher, boatbuilder and rumrunner. With his reminiscences in hand — they had originally been written for his granddaughter Selina Basnight Stokes in 1969 — I spent several days in and around the Great Alligator.

Basnight moved to Buffalo City in 1922. He had been born in 1895 at

*Continued*



Second Creek, a small community of loggers, farmers and shinglemakers in Tyrrell County, then moved with his family to Alligator Creek in 1901. He spent his childhood in the woods hunting, fishing, bullfrogging and doing, in his words, "a thousand things a boy could do." By the age of 12, Basnight was helping his daddy in the log woods and on their one-mule farm.

At 21, he worked for a commercial fisher and lived at a fish camp on Charles Island at the mouth of Alligator Creek. "We did not do too well," Basnight confesses, "but we paid for our nets and eat beans regular and had lots of fun doing it."

After his daddy died of typhoid fever in 1919 and the cotton market crashed the next year, he gave up farming. Like many other Dare County residents,

Basnight had few choices but to find a mill job. In September 1922, he writes, "I put out for Buffalo City."

So did I. On my first day in the Great Alligator, I paddled down Mill Tail Creek to the old site of Buffalo City. A swamp forest of cypress, pond pine, sweet gum and maple had replaced the village. The only relics that I could find were a few railroad tracks and a beat-up concrete wall, part of the old pulp mill. I had to rely on Basnight's memoir to bring the deserted swamp back to life.

Buffalo City thrived many years before Basnight's arrival. In the 1880s, a New York timber company called

Buffalo City Mills located the sawmill village in the swamps about 19 miles west of Manteo. Local laborers and, according to oral tradition, more than 200 Ukrainian immigrants from New York raised the town on the north bank of Mill Tail Creek. In such swampy land, they had to build streets by laying planks and covering them with a thick layer of sawdust.

In 1907, the Dare Lumber Company bought the mill village. The

at the end of the week of work, you'd wind up owing them money. The company store really owned you."

Basnight's memoir agrees. "Most of them [made] less than \$2.00 a day and traded it out at the company store," he recalls. "A lot of them would never see a dollar, just three 000 on their envelope."

Buffalo City was a rough, wild and raucous place not for the mild of heart. The timber company made the

laws, and vigilante justice enforced them. Stories of the city's wooden stockade can still be heard in Dare County.

"That was a Saturday afternoon thing, watching people get punished," one fellow remembered. "They'd whip them till the blood ran down their backs. Leave them locked in



*Possibly the T.M. Sanderlin store outside Buffalo*

company owned Buffalo City's houses, general store, sawmill, school, churches and hotels. Local white laborers lived downtown, but blacks and Ukrainians lived together in a neighborhood to the south. Basnight wrote that about 300 people lived in Buffalo City. Other workers commuted from outlying settlements such as Sycamore and Sand Ridge.

The company paid wages in scrip, pieces of brass or aluminum redeemable only at the company store. "You had to buy groceries there, so that came out of your pay," former Buffalo City resident Hubert Ambrose told the *Virginian-Pilot* years ago. "Sometimes,

there for up to two days. Make a 250-pound logger cry."

To supply Buffalo City with logs, timber camps arose throughout what are now the wildest parts of the Alligator River National Wildlife Refuge. Even Whipping Creek, where I paddled my second day, once had its own post office. Today only black bear, white-tailed deer and recently reintroduced red wolves inhabit that area, but timber workers once built railroads into the swampy interior. Mules hauled the logs to the railroads, and steam locomotives carried them to loading docks at Mill Tail Creek.

Basnight built railroads when he



first moved to Buffalo City. He recalls that "my work building railroad was hard but I enjoyed it. It consisted of clearing a 12-foot right of way of trees and putting down the run poles, then cross ties. I could build 15 yards per day and get 20 cents a yard."

He later was a foreman on a skidder, a small steam-powered railroad engine that dragged logs to the main railroad tracks. He also ran a gas locomotive.

Life at Buffalo City was hard, but it also had its pleasures. "With this many people in such a small place, there was never a dull moment, for all the young folks would be gathered somewhere every night," Basnight says. "But bedtime was not later than 10 o'clock. Everybody was up next morning by 4:30 in order to catch the train in the woods at 6 o'clock."

The Red Onion Hotel, where Basnight lived, was the scene of weekly dances featuring well-known Dare County fiddlers such as Webb Ambrose and Jessie Smith. At one of those dances in 1924, he writes, "I got my eyes on a young girl in blue serge sailor suit." Soon he was accompanying that girl on boat trips down Mill Tail Creek, or the two paddled up to Sawyer Creek to pick water lilies. "Well," Basnight tells his granddaughter Selina, "it was many years later you learned to call her Mama."

Basnight also enjoyed the

camaraderie of the mill workers and loggers at Buffalo City. "There was only one class of people here," he says. "There was no upper crust. Everybody eat their dinner of beans and sow belly out of a tin bucket and washed it down with black coffee — and worked ten hours a day at 15 centers per hour. ... They would take you at face value and never question your past."

The last of the old-growth timber

Basnight returned for a while, building a home for his family in a shady grove of sweet gum and cypress (with a lawn two feet deep in shingle dust) in 1935. He later made a living as a wooden boatbuilder in Elizabeth City, where he crafted moth boats and flat-bottom fishing skiffs. He died in 1971.

Buffalo City's survivors and their descendants still gather for an annual homecoming at the Mount Zion Methodist Church at East Lake, but nobody lives by Mill Tail Creek today.

I had a wonderful three days in the Great Alligator. I enjoyed the swamp's serenity; and the mosquitoes, ticks and cottonmouths hadn't begun stirring yet. I did get drenched near Sawyer Creek — I'm not telling *that* story — but I was lucky enough to find an old logging



*Logs at transfer station on Mill Tail Creek*

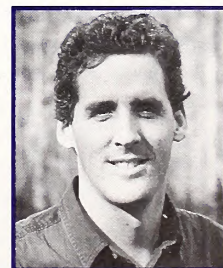
bridge where I could dry out. I was thrilled to explore the Great Alligator and, with Basnight's help, to discover a forgotten world whose memory might otherwise have faded, like Buffalo City, into the swamp.

was soon cut in the Great Alligator. The Dare Lumber Company went bankrupt in 1917, and none of its successors lasted very long. Basnight lost his job when the last of the big lumber companies closed in 1926. But he stayed a few more years to build a small sawmill for the Duvall Brothers and cut juniper logs near Beechland, farther up Mill Tail Creek.

Buffalo City didn't disappear right away. The famous East Lake moonshining business kept the old mill town afloat during Prohibition. But after the liquor trade was made legal again in 1934, the boomtown gradually faded into a ghost town.

bridge where I could dry out. I was thrilled to explore the Great Alligator and, with Basnight's help, to discover a forgotten world whose memory might otherwise have faded, like Buffalo City, into the swamp.

*David Cecelski is a historian at the University of North Carolina-Chapel Hill's Southern Oral History Program and a regular columnist for Coastwatch.*





## A Guide to the Historic Architecture of Eastern North Carolina

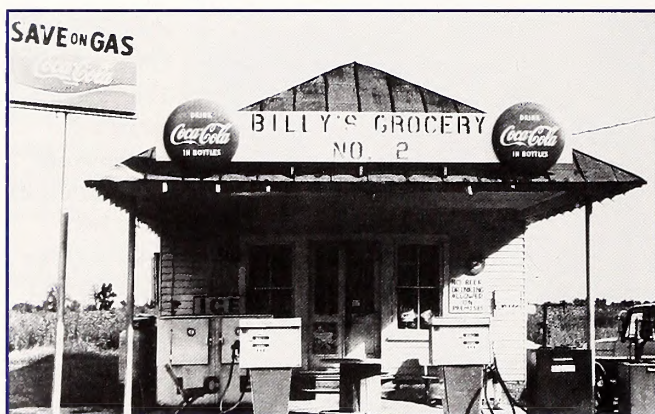
*Bishir, Catherine W. and Michael T. Southern. 1996. The University of North Carolina Press.*

The Coastal Plain of North Carolina holds many treasures in its barrier islands, extensive forests, river bottomlands and agricultural fields. Naturalists, with field guides in hand, observe and identify birds, flowers or butterflies. But a growing population of a different observer scours the Coastal Plain. Like naturalists, these seekers gaze out of car windows and poke

Bishir and Southern mention at least 1,700 buildings and include more than 400 photographs and drawings.

Guides provide clues to identify what you see and suggest where sightings are more likely. The book's strengths lie in clear writing, detailed descriptions and ease of use. It is a standard size, just right to keep in your car or backpack. And like any good

structures and also do an admirable job abbreviating the historical forces behind the great diversity of Coastal Plain architectural designs. For example, they explain how North Carolina's geographic position between North and South and between temperate and tropical climates was critical to trade between New England and the Caribbean. They also tell how styles im-



*Billy's Grocery No. 2, Nash County*



*Smith Warehouse, Wilson County*

around the edges of fields, whispering and pointing. Their reward is to find North Carolina's architectural treasures. And now *A Guide to the Historic Architecture of Eastern North Carolina* will speed their quests and focus their searches.

The authors, Catherine Bishir and Michael Southern, both with the N.C. Division of Archives and History, have written a diverse and extensive guide for explorers with a historical bent. The 483-page book has two sections, divided by detailed county road maps. The first section analyzes the historical influences on design and construction. The second section is a 41-county tour of homes, churches, warehouses, and commercial and government buildings. The authors describe each town in the context of its architecture, complete with references to great shade trees.

nature field guide, this one encourages wise searching — respect private property and drive safely while looking for specific buildings.

By the end of a Coastal Plain tour, the enthusiast will be able to answer the following questions. Where are the two octagonal houses designed in the 1850s by New York phrenologist Orson S. Fowler to protect against hurricanes and to induce healthfulness? What is the famous brick design on the Newbold-White House, the oldest brick home in North Carolina? Which lighthouse is the oldest? Where are homes that reflect Italianate detail? Which town harbors one of the state's finest Beaux Arts classical courthouses, designed by a Greensboro architect? How many log tobacco barns can be counted on a drive from Raleigh to Wilmington?

Bishir and Southern point out these

ported from these regions influenced architecture here. They describe colonial houses built with traditional New England floor plans and tropical touches such as verandas and deep, cool porches. Later, these early 18th-century homes and municipal buildings were updated to reflect the 19th-century look, and you can note functional as well as decorative additions. Some homes demonstrate more than 200 years of modification.

The authors also describe the influence of North Carolina's export economy, which was based on natural resources. Huge forests of longleaf pine fed the naval stores and lumber industries. Cypress and other hardwoods from the bottomland swamps provided barrel staves and shingles, which were shipped north and south. This trade encouraged the growth of small coastal



towns such as Edenton, where proud merchants built solid waterfront homes not far from docks and harbors. Imported pattern books by both English and American designers influenced the merchants' taste.

Bishir and Southern point to the early 19th-century construction of railroads, connecting North Carolina to northern and southern trade, as another pivotal influence on architecture. Small inland communities benefited from the growing market economy the railroads brought. Farmers grew cash crops and bought more goods, fueling the construction of stores and ware-

Town and urban population surges changed the face of early 20th-century communities with the need for workers' housing. The authors describe the evolution of middle-class neighborhoods with their tree-lined streets of houses with low silhouettes and deep porches. The distinctive tapered porch posts and angular roof brackets defined the Southern bungalow. Shotgun houses dominated the working-class neighborhoods of primarily African-American families. This structure – one room wide with front and rear entrances – is believed to have origins in African designs.

past are disappearing.

*A Guide to the Historic Architecture of Eastern North Carolina* is an important tool for increasing awareness and promoting preservation of historic designs such as the shotgun house, tenant farm and classical courthouse. Some of these buildings are meticulously maintained; others desperately need restoration.

"Every year, dozens of important structures and landscapes in North Carolina are at risk of destruction and terminal decay," says Myrick Howard, executive director of Preservation North Carolina. "We are constantly on the



*Mill Village, Roanoke Rapids, Halifax County*

houses. Although most substantial homes were still designed with the traditional forms (symmetry and restrained classicism of the Greek Revival period), much of the architecture began to reflect local standards.

Poverty after the Civil War redefined agricultural practices and the landscape, and the authors poignantly describe the post-war transition of the 1860s. Tenant farmers in small homes tilled smaller fields. Town populations dwindled as people moved westward to the emerging industrial towns of the Piedmont. The authors describe this as the last era of labor-intensive family farming, which left a legacy of farmhouses with outbuildings, tobacco barns and country churches. Although these buildings comprised the human landscape 100 years ago, they still appear on nearly every roadside today.

Also, a new focus on public education resulted in hundreds of brick schoolhouses in rural areas.

Bishir and Southern guide readers through the driving forces of architectural design from the Great Depression of the 1930s to the present. The Coastal Plain's agricultural economic base faded, and the rural population suffered or left. The New Deal's federal programs and the start of World War II brought back full employment and prosperity. More recently, the recreation and tourism industries have brought new wealth to the beaches, but not inland. Bishir and Southern note that the fear of cultural homogenization is now realized through strip malls, fast-food restaurants, cul-de-sac subdivisions and planned communities. The small-farm landscape and small-town flavor of the



*St. John the Evangelist Episcopal Church, Chowan County*

lookout for endangered properties and for potential buyers who will restore and preserve them. Several properties noted in this book were highly endangered only a decade ago."

Bishir and Southern offer an excellent guidebook. You, the reader and explorer, need only curiosity, a good map and perseverance to locate the sites. No trip to the beach should be a straight drive when the Coastal Plain's back roads offer fascinating stories of North Carolina's history through the details of its architecture. ■

– Lundie Spence

*(If this guidebook piques your interest in historical preservation, contact Preservation North Carolina, P.O. Box 27644, Raleigh, NC 27611. Phone: 919/832-3652. E-mail: presnc@mindspring.com.)*



## Grant Money Awarded to North Carolina Fishers

Nearly \$800,000 in state funds has been approved for research that will yield new information about North Carolina's fisheries resources and give insights into how they can be better utilized and managed.

After extensive reviews, 32 projects were funded from a total of 87 proposed to the Fishery Resource Grant Program; two others have conditional approval if the applicants agree to make some revisions.

"We were pleased with the quality of the proposals submitted," says Ron Hodson, interim director of the North Carolina Sea Grant College Program, which is administering the program. "This is the type of information that the Division of Marine Fisheries and the Marine Fisheries Commission need to better understand and manage fisheries. And more importantly, this program involves fishermen in developing the needed information."

Sea Grant assembled a steering committee of leaders from coastal fishing organizations and agencies to objectively review the proposals. The Marine Fisheries Commission (MFC) made the final funding decisions.

The program pays for qualified research by people in the fishing industries, including commercial or recreational fishing, aquaculture or mariculture, and seafood handling (processors or dealers). The funds are dispersed among four priority areas

identified by the state legislature: new fisheries equipment or gear, environmental pilot studies, aquaculture or mariculture and seafood technology.

The selected projects can be categorized by:

- 2 (6 percent) are environmental pilot studies,
- 2 (6 percent) are in seafood technology.

### Applicants

- 28 (82 percent of the total) do not represent academia,
- 6 (18 percent) do represent academia.

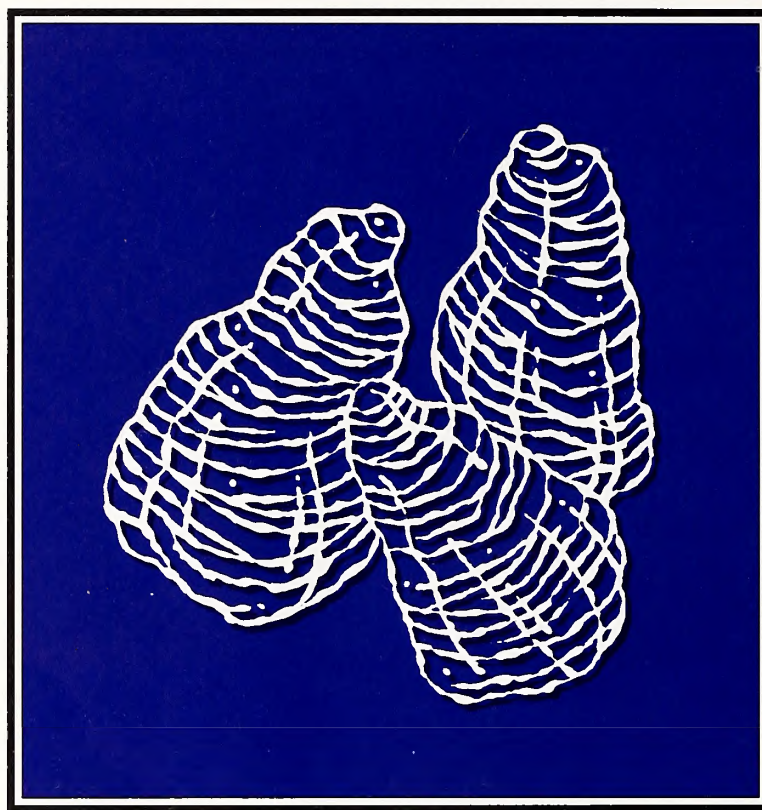
Joe Clem, a member of the MFC and chair of its committee on resource management grants, says he was pleased that the preponderance of funding was awarded to fishermen. "Those who have been involved in this, the third year of the program, continue to see progress as more fishermen are benefiting from participation," he says.

However, not all of the money available was awarded because the commission limited funding to those proposals with the highest

probability of success, Clem says.

"We chose to support quality proposals that offered broad benefit," he says. "We really wanted proposals that would make the greatest contribution to improving utilization and management of the fisheries resources."

The program was established by the legislature in 1994 as the first U.S. program of its kind. It was based on the principle that people in the industry often have the best ideas for enhancing fisheries but lack the financial resources to experiment with innovations. The intent is to invest in the ideas of the fishing public through fair and competitive methods.



### Region (reflecting Division of Marine Fisheries regions)

- 9 (26 percent of the total) are in the northern region,
- 9 (26 percent) are in the southern region,
- 8 (24 percent) are in the central region,
- 7 (21 percent) are in the Pamlico region,
- 1 (3 percent) covers all regions.

### Priority areas for funding

- 21 (62 percent of the total) focus on fisheries equipment or gear,
- 9 (26 percent) focus on aquaculture or mariculture,



When their projects are completed, the researchers are required to share their findings among fellow fishermen, the MFC and academic institutions.

"A lot of them said they would go to local organizations," Clem says. "If they're in aquaculture, they'll go to the annual aquaculture conference and make a presentation. Some make presentations to the MFC. Others have prepared videos. Generally they are pleased to come and talk about their experience at any opportunity."

In June, the MFC is planning to review and update the priorities for the program's 1997-98 funding cycle, Clem says.

"This will start the process earlier and give fishermen more time to prepare and work with Sea Grant and the Division of Marine Fisheries in developing applications for the next cycle of the grant program," he says.

### **New Map Evaluates Potential for Zebra Mussel Infestation of North Carolina Waterways**

For the first time in North Carolina, a study has examined the vulnerability of state waterways to infestations by zebra mussels — a prolific and costly exotic species. These findings have been plotted onto a map and presented to a gathering of natural resource managers in Portland, Ore.

Barbara Doll, North Carolina Sea Grant's water quality specialist, produced the risk-assessment map of state waterways based on water quality

data from 417 sites. Specifically, she looked at five parameters (calcium, pH, dissolved oxygen, temperature and salinity) that influence the zebra mussels' ability to live and reproduce. Then she compared each of these

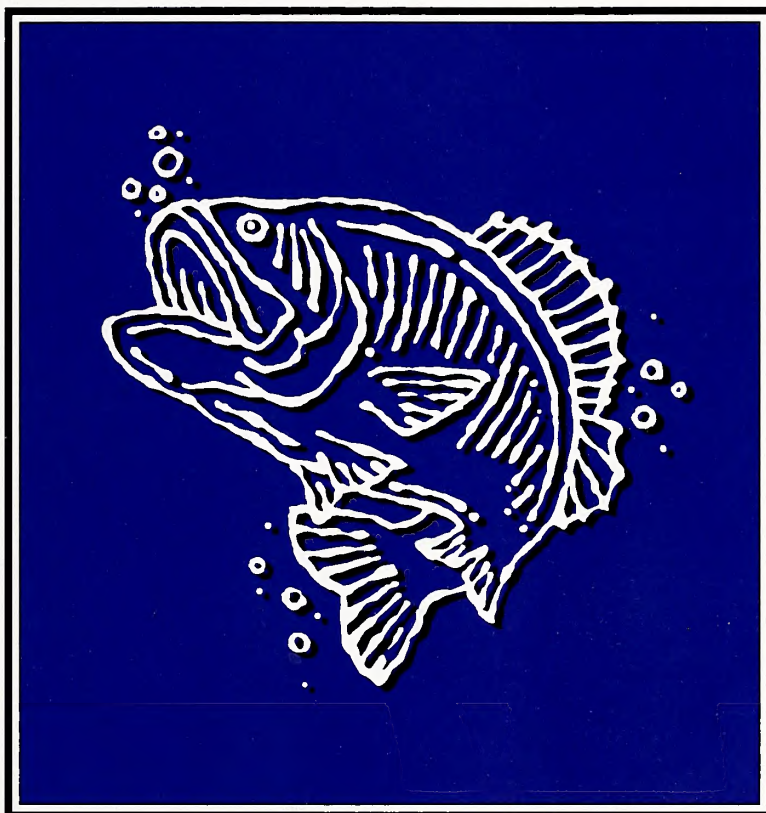
canal networks, which has left behind a trail of infestations. Meanwhile, in Connecticut and Michigan, recreational boaters and fishers have carried zebra mussels to inland lakes on their boats and trailers. The

mussels have encrusted the insides of water-intake pipes and water treatment and industrial processing facilities. They've attached to underwater pilings, locks and even submerged cars, becoming so prolific in some areas that they've altered aquatic ecosystems.

In the Great Lakes area, where the infestation began, industries and public utilities could only react to the problem. But other parts of the country — including North Carolina — have had enough warning and information that they can approach the threat proactively. Most large, at-risk facilities in North Carolina have

already outlined plans for preventing and managing the costly mollusks. But many smaller facilities — including municipal water treatment plants, industrial processing facilities and lake associations — have not taken precautions.

The map — available free from Sea Grant — can help explain the risk of zebra mussel colonization in state waterways, which is the first step toward developing a plan of action. It can also help resource managers better target education, monitoring and enforcement programs. To order, write Box 8605, N.C. State University, Raleigh, NC 27695, or call 919/515-2454. Ask for UNC-SG-97-01. ■



parameters to conditions in state waterways. The results of her comparison are displayed on the map.

Although zebra mussels have not yet arrived in North Carolina, they've wrought havoc in other states and have cost millions of dollars in control and cleanup. Discovered in the Great Lakes in 1988, the mussels have spread throughout much of the Northeast. They've traveled as far south as Louisiana through the Mississippi River system and worked their way west into Oklahoma by way of the Arkansas River. About the size of a thumbnail, they have moved with the aid of human activities, including barge traffic on the Mississippi and its



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# From the Editor

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## Summer Reading

The heat and humidity of our Southern summers has finally arrived. After North Carolina's cool spring, I welcomed the hot sun. A born Southerner, I yearn for long summer days. To me, summer means fun. It's cookouts with friends, late afternoon swims, cool clothing and strappy sandals, hours by the ocean and a shady spot with a good book.

During summer, many people explore new places, seek new adventures. If you want a thrill, go hang gliding this month with *Coastwatch* staffer Daun Daemon. She recently made her first flight at Jockey's Ridge. Join her for the fun.

When it comes to summer cooking, I head for the grill. Friends and neighbors can gather round while I cook



salmon steaks and shrimp kabobs over the coals. For recipes and grilling tips, pore over our latest batch of information from seafood guru Joyce Taylor (Sea Grant's retired seafood education agent).

For those days when the thermometer tops 90 F, you have to seek the shade. In many Southern homes, that means lazing about the porch in a swing or rocking chair with a glass of

iced tea at hand. Free-lance writer Odile Fredericks reminds us of the comfort of porches.

Sit back on your porch or deck this summer and enjoy *Coastwatch*.

*Kathy Hart, Managing Editor*

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*Designer:* Linda Noble

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*Circulation Manager:* Sandra Harris

The North Carolina Sea Grant College Program is a federal/state program that promotes the wise use of our coastal and marine resources through research, extension and education. It joined the National Sea Grant College Network in 1970 as an institutional program. Six years later, it was designated a Sea Grant College.

Today, North Carolina Sea Grant supports several research projects, a 12-member extension program and a communications staff. Ron Hodson is interim director. The program is funded by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration and the state through the University of North Carolina.

*Coastwatch* (ISSN 1068-784X) is published bimonthly, six times a year, for \$15 by the North Carolina Sea Grant College Program.

Box 8605, North Carolina State University, Raleigh, North Carolina 27695-8605. Telephone: 919/515-2454. Fax: 919/515-7095.

E-mail: [k\\_hart@ncsu.edu](mailto:k_hart@ncsu.edu). World Wide Web address: [http://www2.ncsu.edu/ncsu/CIL/sea\\_grant/index.html](http://www2.ncsu.edu/ncsu/CIL/sea_grant/index.html). Second-Class Postage paid at Raleigh, N.C.

POSTMASTER: Send address changes to *Coastwatch*, North Carolina Sea Grant, Box 8605, NC State University, Raleigh, NC 27695-8605.

*Front cover and table of contents photos of hang gliders at Jockey's Ridge by Michael Halminski.*

*Printed on recycled paper. ♻*





# Coastwatch

## *Features*

### **Call Me Icarus**

Birds do it. Bees do it. Now *Coastwatch* staffer Daun Daemon can do it too. Ever since the ancient Greek storytellers sent Icarus into the air, humans have wanted to fly with wings of their own. Today, hang gliding is a safe and fun way to do that. Daemon takes flight at Jockey's Ridge and shares her uplifting experience with readers. .... 2

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The Trinity Center on Bogue Banks is an asylum of sand, marsh and maritime forest tucked off Highway 58. It's a conference facility and more. It's a place where people can learn the values of gentle living. Kids can sink nets into estuarine waters in search of what lives there. And senior citizens can explore the geography of the island and cultures of centuries past. .... 16

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# Call Me Icarus

By Daun Daemon • Photographs by Michael Halminski

What is it about edging toward 40 that makes a person want to take risks, do something daring, try to feel youthful and vibrant again? You know ... heart racing, palms sweating, adrenalin surging?

Some folks jet to France to seek romance with a dreamy-eyed Parisian who speaks a lilting tongue and proffers sinful pastries. Others quit their corporate jobs, move to the mountaintop and write mystery novels. And still others confront their phobias, challenging themselves to lose their fears.

I felt the urge for a blood-pumping adventure a while back, around the time I turned 36. And it didn't take long for me to figure out how to capture that feeling without traveling all the way to Europe for a fling, giving up my job security or letting a tarantula crawl up my arm.

Like many people, I've always wanted to fly, to feel my feet rise from the ground and the wind lift me into the blue. Reared in the upper foothills of

North Carolina, I was captivated by the story of The Blowing Rock. Legend has it that a Cherokee brave jumped off the outcrop rather than choose between loyalty to his tribe and the Chickasaw maiden he had come to love. Days later, a wind blowing up from the valley floor tossed him back into his lover's arms.

That's certainly one way to go airborne, I thought. Not one I was willing to try, though I distinctly remember standing close to the precipice and wondering how far out I'd have to jump before the updraft caught me and threw me back onto the rock.

As a teen-ager, I had more reasonable aero-aspirations. I was transfixed by the sight of daring hang gliders sailing above green valleys. One day, I thought, maybe I'll try that.

In April, that day finally came.

## Just an Average Student

The folks at Kitty Hawk Kites, the world's oldest and largest hang gliding school, are so enthusiastic about their

sport that when I arrive for my lesson I never doubt I can get into a glider and float over the sand at Jockey's Ridge without mishap.

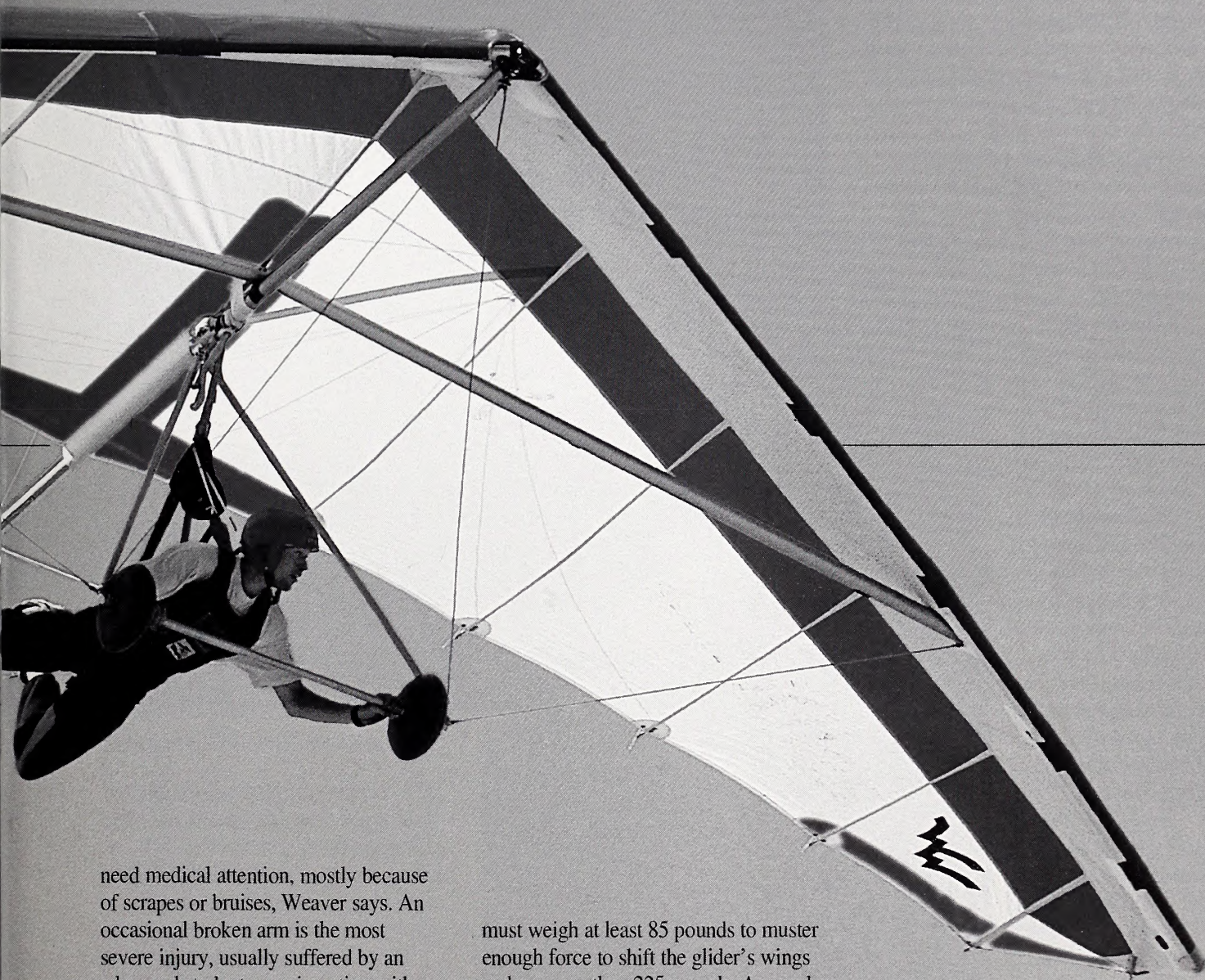
According to Bruce Weaver, director of the flight school, "It's something that anybody can do. It's not a physical sport at all. If you have the desire to fly, you can literally fly on a hang glider."

Hearing those words prior to my lesson is reassuring, even though the misgivings of my family, friends and coworkers echo in my mind. My father: "Daun, I don't think it's a good idea — you never were what I'd call an athletic child." A colleague: "Hey, I wonder what the return on a \$100 investment in your life insurance policy would be."

As it turns out, my father has no reason to worry, and my colleague ... well, he shouldn't quit his day job.

Kitty Hawk Kites, founded in 1974, launches 10,000 to 15,000 student pilots into the air each year. Of those, only a handful — on average, five or six — will





need medical attention, mostly because of scrapes or bruises, Weaver says. An occasional broken arm is the most severe injury, usually suffered by an advanced student experimenting with a difficult maneuver.

Most students are first-timers, about 85 percent, according to Weaver. He estimates that the school has strapped more than 200,000 different people into gliders during the past 23 years.

One reason the school has been able to teach so many people is that the only real limitation is weight: a student

must weigh at least 85 pounds to muster enough force to shift the glider's wings and no more than 225 pounds. Age and physical condition are not limiting factors. At this school, the youngest student so far was 7, the oldest 92. And an instructor here once helped a visually and hearing-impaired man learn to fly.

The average student? It's not a college kid or a 25-year-old sports addict, as I had assumed. It's me. About 60 percent of the students, Weaver says, are

30-something vacationers.

I begin to wonder if taking a hang gliding lesson is a popular way of grabbing gusto during a mid-life crisis — but before the personal implications of that thought can sink in, my lesson starts.

*Continued*



## Loose Grip, Loose Grip, Loose Grip

The first instruction a student receives at Kitty Hawk Kites is by way of a video, which shows would-be pilots successfully and jubilantly making their first flights. For balance, the video also shows some first-timers tumbling onto the sand like drunken pterodactyls — examples of what *not* to do.

As the narrator's mellifluous voice speaks of the "soft and forgiving sand dunes" and encourages students to "let the glider fly you," I have a revelation.

*Aha! It's the zen of hang gliding, I think. All I need to remember is to let the glider fly me. And if it doesn't, the forgiving sand will cushion my fall.*

I can handle that.

The video also urges students to remember two main rules of learning to hang glide: (1) relax and (2) obey the instructor's command. I later learn the importance of rule number two.

First, though, I have to get into the harness that will cradle me under the glider. Weaver introduces the equipment, showing my classmates and me how to step into the harness and explaining the importance of the carabiner, the hook on the back that attaches to straps on the glider.

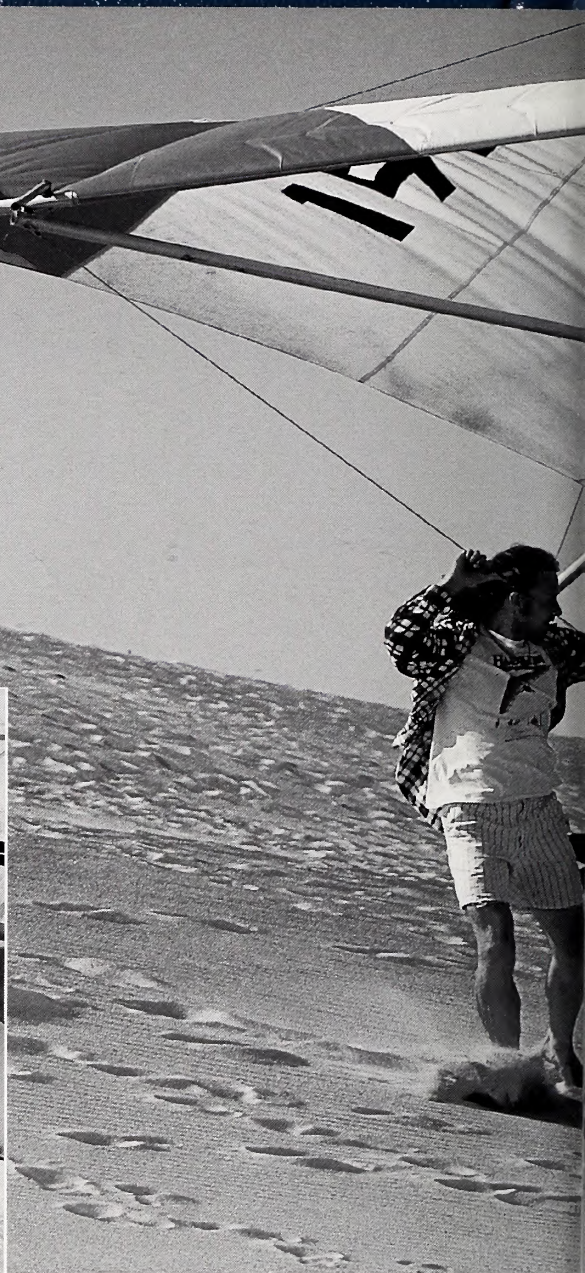
I know I am in trouble when I can't adjust the leg straps to fit snugly against my thighs. Weaver had made it look so easy — just lift the strap and pull, he'd



Andy Torrington explains the physics of hang gliding.

said during his effortless demonstration. I wrestle with my own straps as the other students and I heave ourselves over the front dune to the site of our lesson.

The instructors I meet at Jockey's Ridge are young, tanned and fit — they



The author flies — not too high. Torrington

look as if they would be equally at ease wearing a wetsuit and riding the waves as they are flying over the sand. They have a contagious enthusiasm for hang gliding and are patient, courteous, encouraging and compassionate.

And that's a good thing. When you hook yourself to a large winged contraption, jump into the air wearing it and then attempt to set yourself upright again on the ground without flipping sideways — you really want compassion.

Before our first flight, the instructor leads us through a brief ground school, which consists of learning about the structure of the glider and a reiteration of the rules in the video. Our instructor, Andy





## Flare! Flare!

A hang glider is a graceful craft once aloft — on the ground, however, it's a little awkward. I find getting into the glider more challenging than flying it. With the glider sitting on the ground, the pilot must stoop under wires, turn to hook the carabiner, lie on the ground to conduct a preflight check of the straps and wires, then stand and lift the glider by its horizontal bar.

After that, the pilot simply jogs into the wind — and flies.

For an experienced pilot at Jockey's Ridge, that means swirling high over the 85-foot dune for as long as the wind allows. For a student pilot, it means floating in a straight course down the dune, about six to eight feet off the ground with the instructor running alongside, for only a few seconds.

Even so, the first time my feet leave the earth and I am *flying*, I can barely breathe, much less remember everything I had learned from watching the videotape and listening to Torrington's instructions.

One reason the instructor accompanies a student down the dune is to yell commands so that the new pilot learns skills while in flight. The other reason is to keep the student within easy reach.

That's good because miscalculation or hesitation can turn even a short flight from a

smooth glide to a turbulent ride. On my first attempt, I flare as well as a neophyte can, but on my second attempt I have a true learning experience.

As I reach the bottom of the dune, my eyes fixed on the terrain ahead, Torrington tells me to "get ready to flare."

I push out the bar a little in anticipation.

"Not yet!" he yells.

*Continued*



**Instructor Doug Haber readies himself for launch.**

land. It too seems a simple procedure: push the bar up and out forcefully to stall the glider. The pilot will then move from a horizontal to a vertical position and land upright with his feet on the ground. When flaring, timing is everything — yet another important element I later comprehend more fully.

Before I can try out my flaring skills, though, I have to get into the air.

Torrington, explains the forces that make hang gliding work and demonstrates how to shift our bodies to maintain balance and direction.

"The things that are important to remember are loose grip, loose grip, loose grip and keep your eyes up and look at your target," he says. "You're a pendulum. If you hold onto the bar real tight, you can't be a pendulum and swing."

As he shows us how to balance the glider, Torrington says, "It's just right and left and in and out. It's real simple."

My earlier confidence returns.

One of the most important skills to learn is flaring, the technique used to

makes sure her glide is smooth and safe.



I pull back.  
 "OK, now!"  
*Now?* I think. *Really? Now?*  
 "Flare! Flare!"

I thrust the bar out, expecting the nose to lift and my feet to find purchase on the ground. Instead, I land in a bumpy belly slide, leaving behind parallel ruts where my toes have dug into the sand.

"Oops — too late," Torrington says. "You OK?"

I'm laughing too hard to answer him. The sand has sloughed off 30 years, and I feel again like a 6-year-old at recess. No inhibitions. No self-consciousness. Nothing but pure play.

## Flying High

My last three flights are smooth, and I'm even able to progress from holding the horizontal bar as I glide to holding the side bars, a more advanced position.



The author gloats.

Herman Lankford

By the end of my lesson I'm a little winded from hefting the glider back up the dune five times, even with the help of the instructors and the ocean breezes. But I'm not tired — I'm pumped up and ready to go again.

Back at the school's office, Torrington presents me with a first-flight certificate and signs off my first lesson in a logbook.

"Congratulations!" he says, as he hands over the booklet. "Your feet left the ground and you had wings. You flew."

In that respect, I consider myself like Icarus, the mythological high flier with wings of wax and feathers. But my wings didn't melt, and I alit safely back on earth rather than crashing into the ocean. The ancient Greeks who held the Icarus myth in awe would be impressed.

That night as I finally wind down in my hotel room, I look at the many spaces in my logbook yet to be filled in and fantasize about future lessons to take and skills to learn. I can drive to the coast for more instruction on weekends and even get my boyfriend in on the fun. And then there's the exciting prospect of launching from an ultralight and tandem flying with an instructor 2,000 feet in the air. And if I get really good, I can go to the mountains and like that Cherokee brave at The Blowing Rock ...

Suddenly, 40 seems far, far away. ▣

## Want to Learn to Fly?

Few places in the country offer as gentle a terrain for hang gliding lessons as the rippling dunes at Jockey's Ridge State Park, and Kitty Hawk Kites is currently the only school operating nearby. Open year-round except for Christmas Day, the school is busiest from May until October. A basic five-flight first lesson on the dunes costs \$69, but various packages of instruction are also offered.

All equipment is supplied by the school, but you'll want to show up in proper clothing: wear closed-toe shoes and dress



Kitty Hawk Kites owner John Harris

for the weather. A wind-breaker is helpful on cool days, and you may want to bring along sunscreen and sunglasses.

If you're traveling to other areas of the country where the sport is popular, the United States Hang Gliding Association, based in Colorado Springs, Colo., can help you locate a school. ▣

### Telephone Numbers

- Kitty Hawk Kites:  
919/441-4127 or  
800/334-4777
- United States Hang  
Gliding Association:  
719/632-8300

Daun Daemon



# Gliding through History

By Daun Daemon

In 1020, Oliver of Malmesbury, an English monk, donned wings of cloth, climbed a tower and jumped. He hit the ground. Also in that century, a fellow in Constantinople did much the same thing. He died. Word about the danger and futility of jumping off a tower while wearing ill-conceived “wings” of various materials must not have traveled quickly because men kept at it for centuries. Some died, and some got up smarting and got smart — they didn’t try again.

But they all did something necessary: They showed the would-be birdmen who came later what did *not* work.

It wasn’t until the 1800s that significant developments in manual flight were made by fearless inventors such as John J. Montgomery, Percy Pilcher and Otto Lilienthal. All eventually died in their gliders but only after proving that they could indeed fly.

In the 1960s, modern hang gliding was born when NASA engineer Francis Rogallo (known as the father of hang gliding) designed a kitelike wing for use in military parachutes. The Rogallo kite quickly became the basis for modern hang gliders, and the sport progressed literally in leaps and bounds.

By the 1970s, pilots were jumping off mountains in kites made of sailcloth and aluminum — and living to tell about their exhilarating experiences.



Even Leonardo da Vinci designed wings for man

These days, aspiring pilots have little difficulty finding instruction. Not so two decades ago when John Harris, owner of Kitty Hawk Kites in Nags Head, saw a newspaper photograph of a pilot hang gliding in Utah and decided to try it himself. After ordering a glider through the mail, he and a few buddies taught themselves to hang glide by running off Jockey’s Ridge into the ocean breezes.

It might be tempting to compare those fearless young men to the tower jumpers of centuries past, and Harris himself admits that in the sport’s early years pilots pulled some stupid stunts.

“In the ’70s, people were buying gliders mail order and then jumping off Pikes Peak with no experience, doing crazy things like that. People just assumed they could fly the gliders,” he says.

But jumping off Pikes Peak in the Colorado Rockies and into the winds at Jockey’s Ridge with no experience are as different as learning to drive a car on a Los Angeles freeway and a country road. The degree of risk isn’t the same.

Folks today also can feel more assured about the sport’s safety than those who winged it 20 years ago.

Harris says that in the early years there were “dive recovery and tumbling problems” — enough to scare away all but the most dauntless souls — but now pilots wear parachutes and gliders are designed to prevent these unwelcomed maneuvers. The kite configura-

tion is the same, Harris says, but the frame is beefier and has more ribs to hold the wing shape. Gliders are also heavier. Early models weighed about 45 to 50 pounds, but state-of-the-art gliders today tip the scales at about 55 to 60 pounds.

An improved craft is certainly a safety plus, but equally important is the availability of information and instruction. Hang gliding associations, clubs and schools nationwide help ensure that most people learn to fly under the tutelage of veteran pilots.

Well-designed craft and a broad knowledge base make hang gliding one of the least dangerous adventure sports. According to Harris, it is a safer pastime than popular sports such as scuba diving and snow skiing.

“Statistically, it’s the safest aviation sport too. It’s safer than flying small planes. It’s safer than parachuting. It’s safer than ballooning,” he says.

So, as it turns out, Oliver of Malmesbury had the right idea — 950 years ahead of his time. ■





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# Spawning Success with Southern Flounder

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*By Kathy Hart*



*When it comes to seafood, many folks  
are partial to the mild-flavored flounder.  
They want only the thin, white fillets of this popular  
flatfish alongside their slaw and hush puppies.*

**B**ut the flounder's popularity has also created problems. Using increasingly efficient gear, commercial fishers have responded to the public's hunger for flounder by catching more fish than natural reproduction can replace, a concept fisheries managers refer to as overfishing. In addition, habitat changes and environmental stresses from declining water quality are diminishing their reproduction rates and survival.

No wonder populations of these flatfish are floundering.

Commercial catches of flounder along the East Coast dropped from 185 million pounds in 1984 to 50.5 million pounds in 1995. And the basics of economic principle say that when supplies are down and demand is high, prices skyrocket. For flounder, prices at grocery stores and seafood markets sometimes top \$7 a pound, making the flatfish as expensive as fresh salmon, tuna or mahi-mahi — species that command top prices at the cash register.

But Sea Grant scientists may have a solution to the problem. Southern flounder is being evaluated as a potential aquaculture species by Craig Sullivan, a North Carolina State University reproductive physiologist; Harry Daniels, an N.C. State University aquaculture specialist; Ron Hodson, North Carolina Sea Grant's interim director; and Ted Smith, a South Carolina Sea Grant fisheries biologist.

Flounder aquaculture could supplement harvests of wild-caught fish, offering seafood suppliers an abundant, year-round supply and consumers a catch of a moderate price.

Already, researchers have developed some of the science needed to culture summer flounder, a species that inhabits the offshore waters from North Carolina northward along the Atlantic coast. One commercial hatchery is operating, and a few grow-out operations are under development in northern states.

But for North Carolina and its southern neighbors, southern flounder is the species of

choice for aquaculture. The southern flatfish have several attributes that make them excellent candidates for culture. They mature rapidly (two years) and tolerate variations in salinity and temperature.

These characteristics are much like those of hybrid striped bass, which are grown in freshwater and low-salinity ponds throughout the Southeast. Pond culture of the hybrid has exploded since Sea Grant, the National Coastal Resources Research and Development Institute, and Aurora farmers Lee and Harvey Brothers teamed up eight years ago to demonstrate its viability as a commercial aquaculture species. Southeast fish farmers now harvest 10 million pounds of hybrid bass valued at \$22.5 million each year.

Sea Grant researchers want to repeat their hybrid successes with southern flounder. But before fish farmers start seeing dollars and digging ponds, researchers such as Sullivan, Smith, Daniels and Hodson must complete scientific studies that tackle issues ranging from spawning control to types of feed.

The process starts with Sullivan, who is determining if hormones can be used to force the southern flounder to spawn on demand. Wild flounder spawn December through January, a reproductive window that would limit year-round production for culturists.

By injecting the female southern flounder with hormone capsules the size of pencil lead and manipulating light availability, Sullivan and Smith have successfully extended the spawning season six to eight additional weeks.

The fish spawn in tanks, where Sullivan keeps a ratio of two males for every female. Unlike striped bass and white bass, which must be handled for spawning, southern flounder release their eggs and sperm without assistance. That's good because the flatfish are not as hardy as the bass, and handling would result in high mortality rates for the adult flounder, Daniels says.

*Continued*

### **Flounder Fact:**

In 1995,  
flounder were  
the fifth-most  
harvested  
fish species  
in the nation,  
according  
to the  
National Marine  
Fisheries Service.  
The same year,  
flounder ranked  
sixth in  
dockside value.



**Flounder**  
**Fact:**  
Southern  
flounder feed  
by partly  
burying  
themselves  
in the sand  
and waiting  
to ambush  
their prey.  
The diet  
changes as  
the fish grow.  
Small flounder  
feed on mysid  
and penaeid  
shrimp and  
other small  
crustaceans;  
larger flounder  
eat blue crabs,  
penaeid shrimp  
and fish.

Once spawning is complete, the fertilized eggs, which are naturally buoyant, float to the top of the tank. They are carried over the side by overflow waters and captured in an egg collector.

The fertilized eggs are incubated for about 48 hours before they hatch into tiny helpless larvae with no fins, scales, eyes or mouths. For the next four days, as they develop mouths and fins, they survive by absorbing the nutrients in the attached yolk sac. At this point, Daniels takes over study of the larvae.

The larvae live in a small tank, about 100 fish per liter of water. After four days, it's time for the larvae's first real meal. Daniels feeds them live microorganisms, primarily rotifers.

"This is a critical time," Daniels says. "A lot of the larvae are unsuccessful at eating. They don't capture the rotifers and quickly starve to death. We have the highest mortality at this point — 60 to 80 percent."

Many larvae suffer from mouth deformities, particularly gaping mouth syndrome. The mouth hangs open, and the larva has no ability to close it and hold in food.

Daniels is working to determine what causes the deformities but suspects it may be bacteria or an environmental factor such as temperature.

Fifteen to 20 days after the larvae hatch,

Daniels introduces them to larger feed: brine shrimp. At this point, the tiny youngsters resemble other fish larvae. They swim in an upright position, have an eye on each side of the head and are nearly translucent.

But at 25 days of age, all begins to change. During a two-week period, the fish metamorphose. The body flattens, and the left side darkens. The right eye migrates so that both are on the left side of the head. The young flounder become miniatures of their parents.

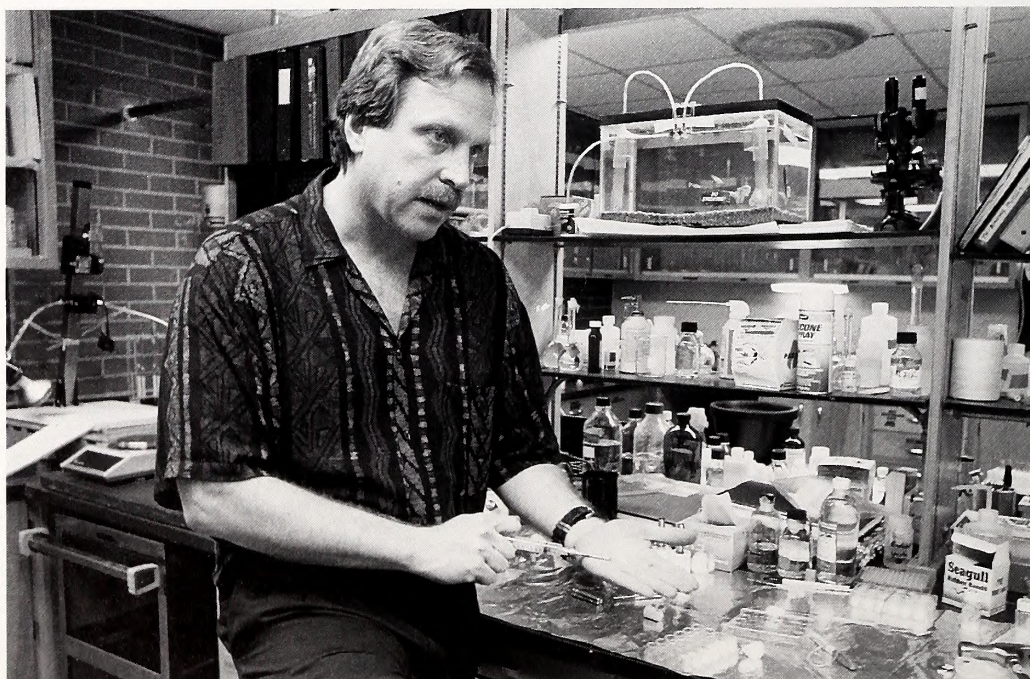
"This year, we had thousands of flounder metamorphose," Daniels says. "We were pleased with our success."

After metamorphosis, Daniels weans the young flounder from their expensive diet of brine shrimp to a more cost-effective dry feed. Then begins the quest for grow-out information, and Hodson joins the research team, adding his knowledge gained from years of raising hybrid striped bass.

Daniels and Hodson will experiment with the young flounder, now considered fingerlings, to determine survival rates; habitat needs; stocking densities; feed types, amounts and schedules; salinity and temperature tolerances; and growth rates.

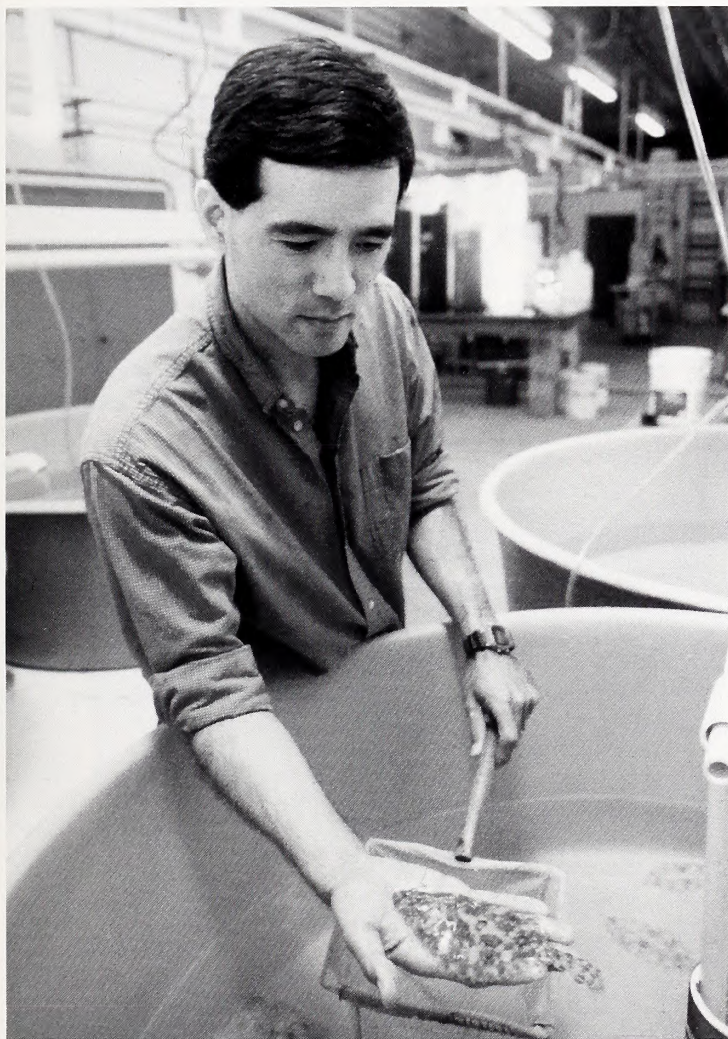
All of these variables must be tested so that

*Jeannie Faris Norris*



*Craig Sullivan shows hormones used to inject female southern flounder.*





*Harry Daniels examines baby flounder.*

the researchers can identify optimum culture conditions before passing the information to prospective flounder farmers.

Currently, the researchers are raising the fingerlings in tanks, but Hodson is anxious to test their growth in ponds such as those used for hybrid bass and catfish. Pond culture is usually less intensive and less expensive than tank culture. But he must answer questions about how the soils used to build the ponds and the waters pumped to fill them will affect flounder growth.

Interestingly, Daniels has learned that once the southern flounder metamorphose from larvae to fingerlings, they can live and grow in fresh water.

"In growth trials, we can't tell the difference in the growth rates of fingerlings grown in

low-salinity water and no salinity," he says.

If flounder culture isn't tied to the availability of brackish water, then flounder farms may be established miles from the coast on less expensive land without a waterfront.

But for now the verdict is still out on salinity. Daniels and Hodson will continue to compare growth rates as the fish mature to a market size of 1 1/2 to 2 pounds during the next two years.

Daniels estimates that the scientists are at least five years from having southern flounder ready for debut into commercial production.

The scientists are optimistic, however, because of their hatchery successes.

"Flounder farming looks doable on a large scale with a modest amount of effort," Hodson says. "And I know some fish farmers who are

anxious for us to work out the science."

Lee Brothers is one of them. Brothers, a man whose future once seemed dependent on agriculture, has now traded the plow for the pond, managing 150 acres of hybrid striped bass ponds and shipping his high-value pond-catch to fish markets in the United States, Canada and Japan.

"There's a really good market for flounder, but there are a lot of unanswered questions still," he says. "Research is helpful to potential farms, and I'm interested in raising flounder when we have the questions answered."

Consumers are ready for flounder farming too. They would like to see supplies of this favored flatfish increase, prices lower and a nice-sized flounder fillet sizzling in the frying pan. ■

## ***Flounder Fact:***

The southern flounder is a prized catch to both commercial and recreational fishers. Commercially, the species is captured in shrimp trawls, gill and trammel nets, and beach seines as well as by spearing. Sportsmen take the species by bottom fishing, trolling natural baits and gigging.





*Not quite outdoors or indoors, porches are an in-between space for resting or visiting.*



# A Passion

By Odile Fredericks • Photographs by Scott D. Taylor

## FOR PORCHES

*In the Caribbean, where I grew up,  
the veranda was a place of gusty salt breezes  
from the ocean that whistled past your ears  
on windy days, blowing your thoughts out to sea.  
It was a place to watch the goats chomping on red hibiscus.  
It was where tea arrived as unpretentiously  
as buttered toast every afternoon amid gossip.*

It was a place to think and listen to the croaking of toads as bats flew at twilight. At noon, the air stood still enough for thought.

At my sister's house in town, overlooking the street shimmering in the heat of the day, the veranda was a place to see and be seen. We didn't miss much from that perch as the sweetness of the early morning with bicyclists hurrying to work gave way to honking cars and laconic walkers at midday.

I arrived in the Carolinas in 1988, after exactly a decade of living without a veranda. The sun on my new front porch welcomed back my childhood, stirring memories. I felt at home as I wandered neighborhoods where people sat motionless on their porches, staring unseeing

into the distance ... letting go.

The feeling of connection was no accident. Although no one can say for sure, it is believed that coastal North Carolina porches — also called galleries, verandas or piazzas — developed from a convergence of French, Indian and African influences in the Caribbean islands.

The idea of living outside in the breezes, yet sheltered from the harshness of the elements, may have first been born in the minds of African slaves from the Caribbean and carried with trade to coastal North Carolina.

"The porch may have been an architectural idea rather than a form — to be sheltered from the rain and sun," says Michael Southern, an author and research historian with

the N.C. Historic Preservation Office. "It provided shelter adjacent to the house where you could work or rest or eat without being inside a stuffy building."

The North Carolina porch took root and thrived along the lower Cape Fear River, settled by Barbadians and people migrating from South Carolina, and in port towns such as Wilmington, where Caribbean trade prospered.

Called piazzas in 18th-century North Carolina, these porches were broad, functional and important as social places in ports from Wilmington to Edenton, says author Catherine W. Bishir in her book *North Carolina Architecture*. Piazzas overlooked and often projected into the street, making them part of community life.

The colonial affection for piazzas is obvious in the diary of Edenton's James Iredell, who is quoted in Bishir's book:

"January 23, 1773. After Dinner til Sunset writing in my Office. Then came home and drank tea. Being by accident in the Piazza I heard Mrs.

*Continued*



Jones in hers, and called to her. She answered me very kindly, and I went over and staid an hour with them very agreeably. Oh! how I hate coldness, and love a cordiality of acquaintance."

When porches came under attack because they were considered conduits for fire, Wilmingtonians rallied to their defense. In 1790, they petitioned the state House of Representatives to revoke sections of a law designed to rid the city of "the many incroachments made on the streets ... by erecting piazzas, porches, platforms and other buildings thereon." Not only useful, porches "in this hot Climate, are essentially necessary to the Health

and convenience of the Inhabitants," they said.

The heat, in fact, drove North Carolinians to their porches. When they designed their houses, they included piazzas from the start. The engaged porch, which is integrated into the house under the main roof, is a distinctive feature of North Carolina's coastal architecture, says Southern. "I expect you'd find it farther south, but it's not seen much north of North Carolina."

In Wilmington, the Burgwin-Wright House, circa 1770, provides an example of the engaged porch.

Nearby, the row houses in the 800 block of Orange Street, each with its own porch, offer a unique perspective on the close-knit bonds

formed across the railings, says Ed Turberg, owner of Edward F. Turberg Restoration in Wilmington.

"Built in the early 1900s, every house has a front porch," he says. "If you sit in any house, it's as if you're in a balcony of an opera house, and it's just a wonderful feeling."

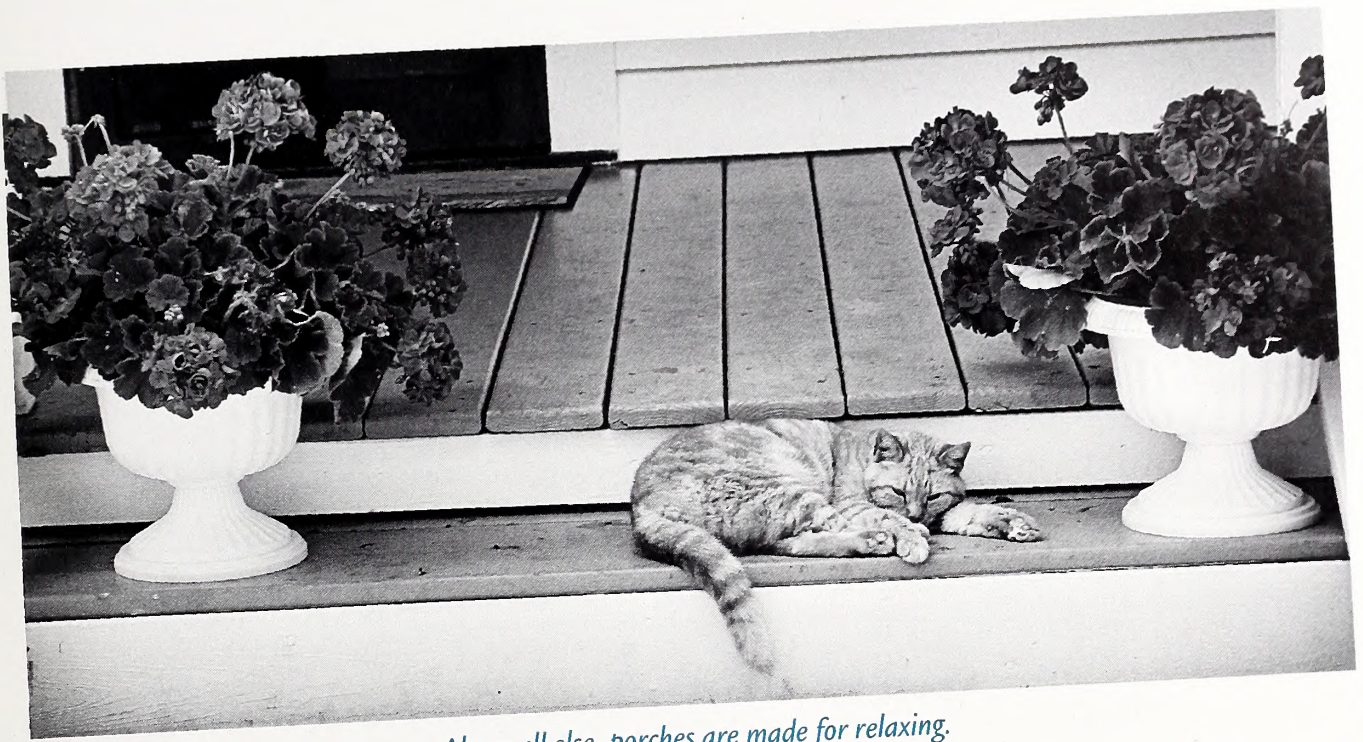
The porch, viewed as an outdoor living room, became an indispensable part of the house rather than an afterthought in North Carolina's hot climate, where ventilation was paramount, says M. Ruth Little, an architectural historian with Longleaf Historic Resources in Raleigh.

"It was in the original mental idea of what a house was," she says, noting that even today, socializing on the porch — with all its subtle unspoken rituals — continues across the



*Coastal porches are a place to escape the heat and to see and be seen.*





*Above all else, porches are made for relaxing.*

North Carolina countryside.

"You can tell if someone is receiving visitors because when they are gone, they turn their chairs upside down," she says. "It's an old tradition."

Porches became an in-between space, not quite indoors but not outdoors, where entertaining was casual and striking up a conversation or saying good-bye was easy.

"You would stop and sit on someone's porch if you saw them there, but you wouldn't knock on their door because you wouldn't want to bother them," Little says.

Although its original appeal was comfort, the porch became a social buffer, where you could meet and talk with people without taking them into the intimacy of your home, Southern says.

"It was a semiprivate kind of place without the formality of going inside," he says.

To this day, Wilmingtonians

such as Larry Hovis, a self-proclaimed "porch hugger," continue that tradition. Sitting on the front porch of his pink Italianate house in historic downtown, with church bells chiming in the background, Hovis explains that he and his wife try to live in their home in much the same way as the late 19th-century residents who built it.

They spend Friday evenings on the front porch of their Fourth Street house drinking wine or sipping martinis, and they eat meals on their back porch. Some days are passed simply talking to folks who might drop by.

"When you're sitting out here like this, people go by — you can't help but talk to them," Hovis says. "It kind of brings you to your community ... It does offer the opportunity to get to know your neighbors."

An avid gardener, Hovis says porch living gives him a chance to

sit back and enjoy his potted geraniums and other handiwork while refreshing his spirit. Overhead, he points out the canopied porch roof, fashioned like a boat's hull and painted blue to look like the sky, two carry-overs from the 19th century.

"In the evenings, there's a nice breeze on the porch," he says. "It's a perfect place to meditate and relax."

Fanned by breezes with a panorama of the outdoors spread out for viewing, porches have long been known to inspire confidences and declarations that might not otherwise spring up indoors. In their embrace, they provide a respite from the turmoil of life, granting us perspective.

Perhaps the reason their origin cannot be traced for sure is that the yearning for such a space exists in each of us. As a child rocking in a veranda hammock and watching the swallows soar into the Caribbean sky, I knew that we all need a place to take in the breezes. ■



# Practicing What They Preach

By Jeannie Faris Norris • Photographs by Scott D. Taylor

*"Gentle living" is the '90s response to excesses of the '80s.*

*Countless books, tapes and newsletters are devoted to the concept of living simpler, environmentally friendlier, less consumptive lifestyles.*

*The Trinity Center on Bogue Banks embraces this philosophy, teaching and preaching the values of gentle living. The barrier island is its classroom.*

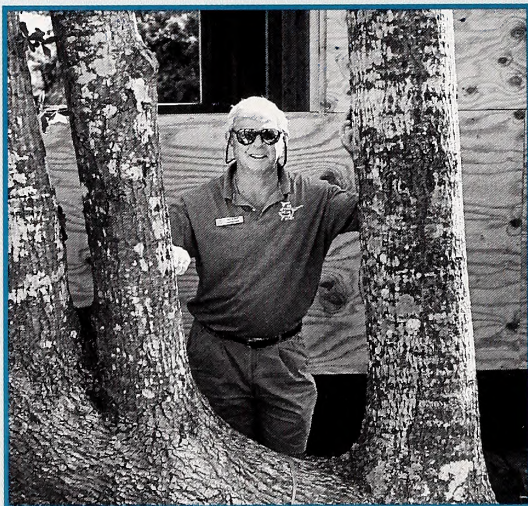
*Owned and operated by the Episcopal Diocese of East Carolina, the center is open to nonprofit groups for conferences, retreats and camps. Kids from North Carolina and beyond attend the Sound to Sea program, and senior citizens visit through the Elderhostel program.*

**L**ive gently. Respect all creatures and the habitats they live in. Think every day about conserving the resources that nature makes available to you.

It sounds like a lecture from the Sierra Club, but this is word fare from the Trinity Center, an Episcopalian conference facility sited on a 60-acre cross section of Bogue Banks. Visitors take home these messages after a few days in the center's environmental education programs. And even those who come only to meet and retreat leave with sound impressions of these words in action.

That's because the Trinity Center staff practices what it preaches.

From new construction to salt marsh instruction, the center takes measures to minimize its intrusion on the barrier island, says Executive Director Mike Morgan. This asylum of sand, marsh and maritime forest, tucked off of Highway 58, has been different



*Executive Director Mike Morgan poses with new construction.*

things to different people for 11 years. It's a relaxing venue to meet for some. For others, it's a living, breathing, growing classroom. Trails wind through the grounds and over the crests of ancient sand dunes. Elderhostel visitors explore the geography of the island and the cultures of centuries past. Kids are encouraged to sink nets into estuarine waters in search of what lives there. And, from a walkway built low over the salt marsh,

they learn that their actions have consequences.

"We built a very low-to-the-marsh walk that allows them to lie on their stomachs and touch these things, to look at them. But they can't get in," Morgan says. "The damage is incredible. From just one person walking through there, you can see the damage for two weeks. Can you imagine 80 kids at a time?"

*Continued*





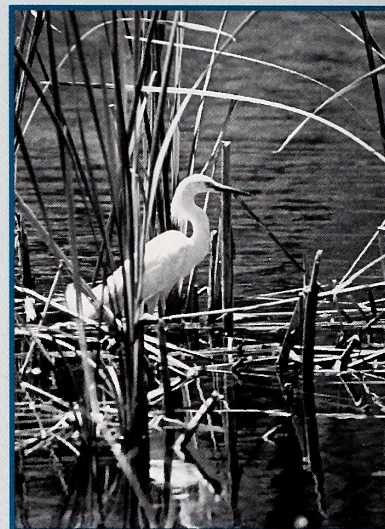


*A low walkway lets kids observe the salt marsh up close.*





*Visitors make a soundside discovery of whelk egg casings.*



*The freshwater pond is a good habitat for bird-watching.*



*Hands-on activities are encouraged by the center.*

This is just one way that an island refuge, the envy of so many people, presents special challenges and responsibilities for its caretakers, Morgan says. Being a good steward of the land is something that he thinks about constantly with up to 20,000 people visiting the center every year.

"Living on a barrier island is a neat experience, but you have to do things a different way," Morgan says. "It takes more time and it can be more expensive, but that's OK. That's part of what we're about."

The Episcopal Diocese of East Carolina was entrusted with its swath of sound-to-sea property 48 years ago by Alice Hoffman, an early conservationist. She donated the land for use as a camp site and conference center. A small beach house was built on the oceanfront in the 1950s, but money wasn't available for the camp until the 1980s. It was then that several

camps were combined into one and named Trinity Center.

Today, the staff's sense of stewardship extends into the center's daily operations and long-range plans, Morgan says. It is what prompts them to preserve the maritime forest as much as possible, minimize water usage, teach kids about a salt marsh without allowing them to destroy it, cut back energy consumption, and recognize when to bulldoze an old ocean-front building and not the beach.

The intent is to live gently and to help visitors make more informed decisions by giving them a better understanding of plants, animals and natural systems, Morgan says.

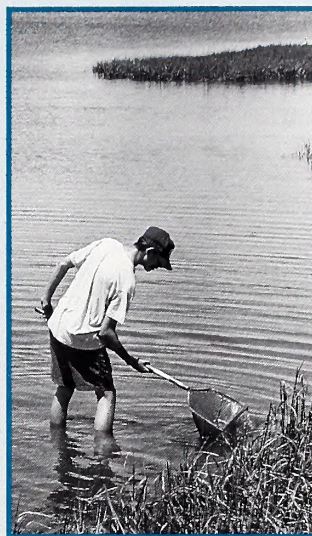
This philosophy is part Morgan, part early mission of the Trinity Center's founders.

Preservation was a priority even in the center's initial design and construction. Buildings were moved two times to

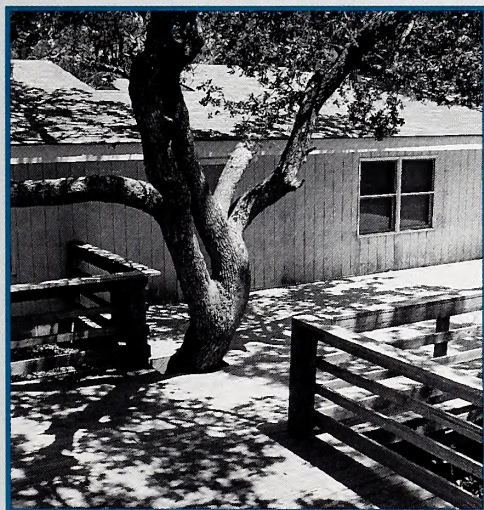




*Program Director B.J. White models an owl costume used in lessons about birds of prey.*



*A visitor explores the marsh's edge.*



*Creative floorplans save trees.*



*A trail ends at Sanders Point.*

save large live oak trees, and the pile-driving machine needed for construction was completely dismantled to avoid damaging the maritime forest.

Now, under Morgan's watch, the same philosophy guides completion of the master plan as conference facilities and bedrooms are added. Floorplans were rearranged to save trees, and you won't see any bulldozers in the forest because everything is hand-cut and pulled out with backhoes. Morgan says he set a tone with the builders at the outset of construction: Don't ruin the forest, and respect the animals that live there, snakes included.

"We're trying to do things in a way that doesn't impact the trees or the support cover as it leads up to the maritime forest," he says. "It costs a little more money, but it preserves the integrity of the maritime forest a lot better."

Morgan came to the Trinity Center in 1990 as a volunteer, intent on putting his money-saving, cost-cutting talents to work. He had retired from the U.S. Marine Corps as a facilities engineer and had run several businesses in the interim. A relaxing retirement stretched before him. But in 1991, he was back in the work force, this time as executive director of the center.

"That set the scene for me, exploring ways to save some money and to do things a little better," he says, explaining his transition from volunteer to leader.

At his direction, changes have been made in the name of conservation, preservation and old-fashioned penny-pinching. Morgan can boast that his techniques have reduced power expenses from 11 percent to 4 1/2 percent of the center's income.

*Continued*





*Trails wind through maritime forest on the 60-acre property.*

"We've been able to cut that back incredibly by doing some innovative things, but they're all off-the-shelf kind of things. It's just a matter of thinking through your strategy," Morgan says.

For instance, incandescent lights are out, and energy-saving fluorescent and halogen are in. Skylights let the sun brighten rooms. Ceiling fans stir and cool the air. Low-flush toilets and spring-loaded faucets have been installed to cut water usage.

A computer controls the timing of cooling and heating cycles in the administrative and conference buildings, keeping energy demands and expenses down. In the guest rooms, where temperature can't be controlled by computer, another innovation is at work. Infrared devices sense when guests are in the

room and allow them to set the thermostat at whatever temperature they like. But when they leave, the device sends the thermostat to a setting predetermined by Morgan. On their return, the thermostat resets to the guests' chosen temperature.

This prevents the up-and-down switch-throwing that some visitors go through trying to quickly cool off a hot room or heat up a cold one. Usually, they aren't aware that these systems are manipulating their room temperatures, Morgan says. And when they are, they tend to give more thought to how they use energy away from home, he says.

"We were just throwing money away, and it's not being a good steward with what we do," Morgan says. "There are other ways to do things."

The first rule of stewardship is to practice what you preach. ■

## Educational Programs for the Young at Heart: School Kids to Seniors

- **Sound to Sea** is the only residential environmental education program on the Outer Banks. With a focus on habitat, it offers school children hands-on activities, a low-ropes challenge course and special evening programs. Last year, 85 school groups explored the barrier island and its five habitats (sound, marsh, pond, maritime forest and dune/beach).

- **Elderhostel** is a continuing education program for seniors. Trinity Center offers courses on North Carolina Native Americans, Carteret culture and local marine life. ■



# Behind the Veil

By David Cecelski

Oral history brings the past to life in ways that books never can. When a 96-year-old New Bern man tells stories about slave grandparents, the time of human bondage seems like yesterday. Through the memories of African-American elders, we can revisit the influenza epidemic of 1919, the maraudings of the Ku Klux Klan and the birth of the civil rights movement. Vacant tenant houses and tobacco farms come to life; displaced victims of the great fire of 1922 are finally heard.


*Continued*

*Segregated water fountains were fixtures of the Jim Crow era.*

Photo courtesy of the Center for Documentary Studies







These stories are brought to light in "Behind the Veil: Documenting African American Life in the Jim Crow South," an exciting and revealing oral history project undertaken by the Center for Documentary Studies, based at Duke University. Over the last five years, graduate students from Duke, the University of North Carolina at Chapel Hill, North Carolina Central University and other Southern universities have interviewed an astonishing 1,200 African-Americans from Virginia to Mississippi. Among them were more than 70 elderly men and women along the North Carolina coast.

Recently I had the opportunity to review the "Behind the Veil" interviews for New Bern and Craven County. The oral history collection isn't open to the general public yet. Much of it still has to be cataloged, indexed and transcribed. But I introduced the project's directors — Raymond Gavins, Bill Chafe and Bob Korstad — to many of the interviewees in Craven County, and they showed their gratitude by opening the collection on a limited basis for my historical research.

I want to give *Coastwatch*'s readers a preview of what "Behind the Veil" tapes will tell us about our history. The interviews focus on the period of Southern history called the Jim Crow era. Named for an antebellum minstrel act that amounted to a racist parody of African-Americans, Jim Crow was the system of American apartheid that prevailed from the 1890s until the civil rights movement of the 1960s.

The forced separation of black and white people was the cornerstone of Jim Crow. "I went to a black church, I had black friends, I lived in a black neighborhood," Ronald White of New Bern tells a Duke interviewer. "The only time I had contact with white people was when I went downtown with my father." New Bern segregated by race its schools, hospitals, graveyards, theaters, restaurants, trolleys and buses, even its water fountains and swimming beaches.

"And you were not even allowed in a restroom in the bus station," recalls Dorcas E. Carter, a retired teacher born in New Bern in 1913. "That got to be devastating."

A black man who defied Jim Crow risked his family's livelihood and put his

life in jeopardy. If he insisted on sitting near the front of a bus or tried to order a drink at a soda fountain, he was bound at least for the "Black Maria," the police paddy wagon. He might well lose his job, have his credit revoked or face a visit from the Ku Klux Klan.

But the "Behind the Veil" interviews reveal that Jim Crow demanded more than racial segregation. It also demanded an outward show of total deference. The Ku Klux Klan — "the businessmen from downtown," a New Bern woman's father explained — terrorized blacks for the simplest things: coming to the front door of a white family's house instead of the back or not yielding to a white person on a sidewalk.

A black man could not even look a white man in the eye. "They would put a black man in jail for direct eyeballing," remembers the Rev. William Hickman, who was born and raised at Hickman Hill, a small community off U.S. 70 between New Bern and Havelock.

African-Americans also faced risks if they showed their intelligence in a way that upstaged a white man. Several interviewees remember a black physician who was driven from New Bern after he healed a white man. Black doctors usually were not allowed to examine whites, but this man's wife insisted that the black physician, a recent graduate of a prestigious medical school, see her husband after the town's white doctors could not heal him. The black physician's medical skill meant his exile.

Many interviews describe farm life under Jim Crow. Sharecropping, the lot of most black farmers, often seemed like slavery. Bessie Spicer, an 80-year-old

New Bern resident, recalls how her family sharecropped at Wyse Fork near Kinston. After her stepfather died, she ran the farm with her mother and sisters. No matter how many "sunups to sundowns" they sweated in the fields, they always owed "the man" at the year's end.

Debt peonage was a way of life. "What the boss man said, went," Spicer states matter-of-factly. Her family had to buy food at a commissary owned by the landlord, and he insisted that children work as a requirement for living in his tenant houses. Spicer's own schooling stopped at the fourth grade. And when they settled with the landlord after the tobacco harvest, Jim Crow decreed that they dare not question his accounting.

Poverty was a fact of life. To go to church, Spicer recalls, they borrowed clothes "from the boss lady" and returned them before dinner.

These oral histories portray much more than Jim Crow's hardships and perils. They also describe quiet struggles for dignity and equality, of perseverance and faith, and of triumph. Most of the elderly black men and women interviewed by the students remember tight-knit families, caring neighborhoods and strong churches that helped them survive.

"We had a lot of love," explains Clarita Wordlaw, later a leader of New Bern's civil rights movement. Many also recall with great pride the African-American schools, especially the West Street School in New Bern.

Several things surprised me in the "Behind the Veil" interviews. One was how often rural black and white people defied Jim Crow by having friendships that crossed racial lines. Janie Williams, a



76-year-old woman who grew up in Pitt County, was typical. During her early married life on a Clayroot tenant farm, she and a white tenant woman alternated fixing supper for the two families. They shared a dinner table, traded farm work and cared for each other's children. "It was like a big family, everybody working and living together," she recalls. Not even Jim Crow could build a wall strong enough to keep people apart all the time.

I was also surprised at how many of New Bern's black families have roots on the Outer Banks. Dorcas E. Carter, for instance, describes in loving detail her grandmother, a fisher-woman who had grown up on Portsmouth Island. By the late 1800s, her grandmother had moved to New Bern and brought her skiff and fishing nets with her. "She would go up the river every day," Carter remembers. "She would take my brothers, and they would come back with crabs and fish."

No event is more prominent in the "Behind the Veil" interviews than the great fire of 1922. Before Dec. 1, 1922, New Bern was home to one of the most prosperous black middle-class communities in the South. The neighborhood of skilled artisans and professional people was centered on George Street near St. Peter's African Methodist Episcopal Zion Church, the mother church of the AME Zion denomination in the South. Interviewees recall the community's many black-owned businesses, its paved streets and gas lights, the beauty of old St. Peter's and the trolley that could be ridden for only 5 cents.

Carter remembers it well. "To me," she tells a Duke student, "I felt as though we were almost like the historic section of New Bern. The houses were very historic and the people dressed so



*A graduate student interviews a woman for "Behind the Veil."*

modest, so cultured. You could see the men escorting the ladies by the arm, all dressed with their walking canes and their derbies. It glowed ... People would come out looking graceful and dignified. Then the big fire came and destroyed this."

The great fire of 1922 incinerated the entire community and left more than 3,000 black citizens homeless. For reasons that are unclear, the town of New Bern condemned the burned-over streets and took the land despite black protests. A cemetery, ballparks and a police station displaced the black community. Impoverished, many of the former residents moved to New York or to makeshift camps on the edge of New Bern. "I always wondered why we could never go back," Carter says. "This was a turning point in my life."

You can tour historic New Bern all day and never know that African-Americans ever lived there, much less played a far more historic role in the town's past than Governor Tryon and his palace. I expect this will change soon. In September 1998, the "Behind the Veil" interviews will be open to the public. Then there will be no more excuses for not honoring our black heritage in historic markers, monuments and museums.

The "Behind the Veil" collection holds hundreds of important stories, but I would like to conclude with one that touched me especially. It is a Civil War

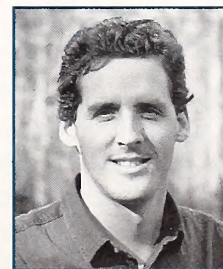
tale told by Annie Gavins, a New Bern resident born in 1913. Gavins grew up with her great-grandmother Hannah, who had been born a slave in Swansboro.

"My great-grandmother told the experience of having seen Abraham Lincoln in Swansboro," Gavins says. "He came to their plantation. He was asking the stable boy questions (about) how he was faring. He was by

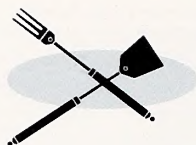
himself. He was well dressed and had nice horses. He was tall. All of this I remember. After he went back to Washington, that's when they started laying the plans to free the slaves. You see, he came to see how things were before he signed the (Emancipation) Proclamation."

History books say that Lincoln never visited North Carolina during the Civil War, but I don't think any historian could shake Gavins' faith in her great-grandmother's story. I heard the conviction in her voice, and I know that hundreds of former slaves told similarly unexplainable stories about meeting the Great Emancipator. Personally, I wouldn't try to change her mind. Who am I, after all, to tell an 80-year-old woman what is possible and what is not? We all have to discover on our own if we believe in the possibility of certain things beyond proof and reason. As for me, I am acquainted with the unbounded power of the heart — and I can hear it in every one of the "Behind the Veil" interviews. ■

*David Cecelski is a historian at the University of North Carolina-Chapel Hill's Southern Oral History Program and a regular columnist for Coastwatch.*







# Sizzling Seafood

## Cooking Your Catch Over the Coals

By Joyce Taylor

Light the fire. Bank the coals. It's time to grill out.

With a grill on almost every deck, it's no wonder that more Americans than ever are opting to cook over the fire. Grilling is a fast, easy way to cook a summer meal without heating up the kitchen.

As for grill fare, why not choose seafood — grouper fillets, tuna steaks, scallops or shrimp? Seafood is healthful, requiring little, if any, added fat. And it's delicious even when plainly cooked. For extra flavor, add sauces or marinade.

Remember to use only fresh fish and shellfish. No amount of grilling or minutes in a marinade will mask the fishy flavor of poor quality seafood.

Here are some tips for better grilling success.

- ◆ Fish in any market form — drawn, dressed, steaks or fillets — may be cooked over coals. Shellfish, depending on the recipe, may be grilled in the shell or shucked.

- ◆ Seafood is fragile. Handle it gently before and during cooking. Firm fish, such as shark or tuna, can be cooked directly on the grill or on skewers. Medium firm fish, such as salmon or grouper, can be too. They're easier to cook as steaks or skin-on fillets at least 3/4 inch thick, or as kabobs. A hinged metal grill or a fish basket makes cooking all seafood easy. They are long-handled and adjust to the fish's thickness.

- ◆ Do not overcook your catch. Fish should always be moist and tender, never dry and chewy. Cook only until it flakes easily when tested with a fork. Crustaceans are low fat and will dry out quickly.

- ◆ Always use a clean rack. Preheat it, then brush with vegetable oil. Cook seafood about 4 inches above moderately hot coals. Fillets will cook in 6 to 12 minutes per inch of thickness. Turn once. Check for doneness before the cooking time is up. Although thin fillets do not have to be turned, they have more grilled flavor if they are. When cooking drawn or dressed fish, score each side with three diagonal cuts to ensure even cooking.

- ◆ Use a covered grill if possible. It allows faster cooking and keeps the seafood moist and tender.

- ◆ Oily fish, such as salmon and mackerel, retain moisture and need little or no basting. Leaner fish, such as flounder or snapper, may require basting with oil, melted margarine or a flavored marinade.

- ◆ Always make marinades in a nonreactive container such as glass or stainless steel. Fish or shellfish require only 15 to 30 minutes to soak up the flavor of a marinade. Marinating seafood too long in high-acid liquids, such as wine, vinegar and citrus juices, turns it opaque with a firm, cooked

appearance. This will cause it to be dry and tough when cooked.

- ◆ If using marinade for basting, set some aside. Never baste cooked fish or shellfish with marinade that has held raw seafood because you could contaminate your dinner with harmful bacteria.

- ◆ Instead of a marinade, try a rub — a concentrated blend of herbs and spices. Create your own flavors such as Mexican, Creole or mixed herbs. Simply rub the mixture into the surface of the seafood before cooking. Or sprinkle it on.

- ◆ Get out the grill. Enjoy!

## Grilled Snapper Parmesan

- 4 small snapper fillets
- vegetable oil
- 1/8 teaspoon salt
- 1/4 teaspoon freshly ground black pepper
- 1/4 teaspoon dried oregano
- 1/2 cup freshly grated Parmesan cheese

Brush fillets with oil and sprinkle with salt, pepper, oregano and Parmesan. Place fish in greased hinged wire grill. Cook about 4 minutes. Brush with oil and turn. Continue grilling about 4 to 5 minutes, until fish flakes easily with a fork. Serves 4.





## Grilled Garlic Shrimp

- 1 pound medium or large shrimp, peeled
- 3/4 cup margarine
- 10 large cloves garlic, minced
- 2 tablespoons fresh lemon juice
- 1/4 teaspoon cayenne pepper
- 1/2 teaspoon dried dill
- 1/4 teaspoon sugar

Melt margarine in heavy saucepan over medium heat. Add garlic, lemon juice, cayenne, dill and sugar. Bring to boil and simmer 1 minute. Remove from heat and allow to cool. Place shrimp in sauce and marinate in refrigerator 20 to 30 minutes.

Thread shrimp on skewers. Grill over medium heat until cooked on one side, about 3 to 4 minutes. Turn and repeat. Serves 3 to 4.

## Mahi-Mahi with Lemon Mayonnaise

- 1 1/2 pounds mahi-mahi fillets
- vegetable oil

### *Lemon Mayonnaise:*

- 1/2 cup mayonnaise
- 1 tablespoon fresh lemon juice
- 1/2 teaspoon salt
- 1/8 teaspoon cayenne pepper
- 1 1/2 teaspoons grated lemon zest

In small bowl, combine mayonnaise, lemon juice, salt, cayenne and lemon zest.

Brush fillets with oil on both sides. Place in greased hinged wire grill. Cook about 4 inches over hot coals for 4 to 5 minutes. Turn and repeat on other side until done. Serve with lemon mayonnaise. Serves 4 to 5.

## Spicy Flounder with Garlic Mayonnaise

- 1 1/2 pounds flounder (or other white) fillets

### *Garlic Mayonnaise:*

- 1 cup mayonnaise
- 1 teaspoon pressed garlic
- 1 tablespoon fresh lemon juice
- 1 tablespoon Dijon mustard
- 1/2 teaspoon dried tarragon

### *Blackened Mix:*

- 1 tablespoon black pepper
- 1 tablespoon white pepper
- 1 1/2 teaspoons cayenne pepper
- 2 tablespoons dried thyme
- 2 tablespoons dried oregano
- 2 tablespoons garlic powder
- 2 tablespoons onion powder
- 2 tablespoons chili powder
- 1 1/2 teaspoons ground cumin

In a small bowl, combine mayonnaise, garlic, lemon juice, mustard and tarragon. Refrigerate.

Combine peppers, thyme, oregano, garlic powder, onion powder, chili powder and cumin. Pour onto plate. Dredge fillets in mixture to coat. Place fillets in greased hinged wire grill.

Grill 4 inches from coals until done, about 8 to 10 minutes. Turn once. Serve with garlic mayonnaise. Serves 4 to 5.

## Spotted Trout with Garlic and Tomatoes

- 4 small trout fillets
- 3/4 cup canned tomatoes, drained, peeled and chopped
- 1/2 teaspoon dried oregano
- 1/2 teaspoon salt
- 1/8 teaspoon freshly ground black pepper
- 2 tablespoons melted margarine

- 1/2 teaspoon crumbled dried rosemary
- vegetable oil

In small bowl, combine tomatoes, oregano, salt and pepper. Brush fillets with melted margarine. Sprinkle with rosemary. Place in oiled hinged wire grill and cook 4 inches from coals, about 3 to 4 minutes. Turn and repeat. Place fillets on platter. Pour tomato mixture over fillets. Serves 4.

## Grilled Flounder with Tomato-Basil Sauce

- 4 small flounder fillets
- 4 tablespoons melted margarine
- freshly ground white pepper
- 1 teaspoon dried basil

Brush fillets with melted margarine. Sprinkle with pepper and basil. Cook about 4 inches over hot coals for 4 to 5 minutes. Turn and cook until fish flakes easily with a fork, about 4 to 5 minutes longer. Serve with heated tomato-basil sauce. Serves 4.

### *Tomato-Basil Sauce:*

- 2 tablespoons olive oil
- 1/2 teaspoon minced garlic
- 1/2 cup minced onion
- 2 1/2 cups canned tomatoes, drained, peeled and diced
- 1/4 teaspoon salt
- 1/4 teaspoon freshly ground black pepper
- 3 tablespoons finely chopped fresh basil

In small pan, heat oil. Sauté garlic and onion until tender, about 3 to 4 minutes. Add tomatoes, salt, pepper and basil. Cover and simmer about 10 minutes. ■

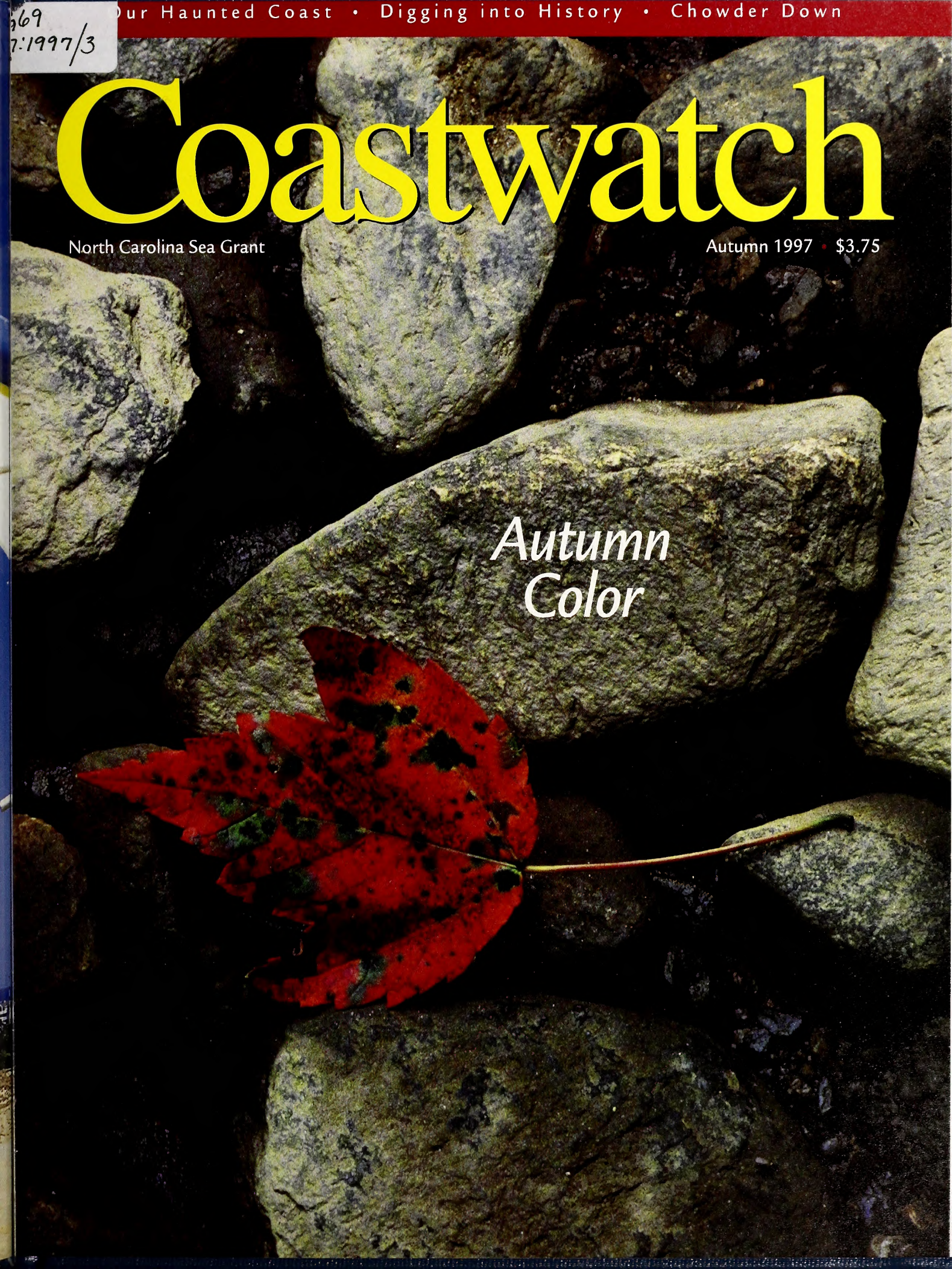


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## *F r o m   t h e   E d i t o r*

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### **Autumn Awaits**

I hope you're enjoying the cooler fall breezes and the beautiful color changes that occur with the season. Turn the page to our new Coastal Tidings section to see which fall flowers will highlight coastal dunes and marshes with vibrant hues.

But beware, just beyond Coastal Tidings is a story sure to frighten. Sit tight as senior editor Jeannie Faris Norris recounts ghost stories that have haunted the North Carolina coast for decades. This story will put you in the mood for Halloween and the beasties who will soon arrive at your door. Just be sure your ghostly goblins are earthbound.

For those of you who yearn for the adventurous life of Indiana Jones, take a trip with historian David Cecelski.



This issue, he sifts the sands of Hatteras Island for insight into the Croatan Indians and the whereabouts of the famous Lost Colony. In the process, he digs deep into the sand and into coastal history.

Finally, peruse our new sections on nature, cooking, books and fishing. They're packed with information that I'm sure you can use to reel in a speckled trout, stir up a bowl of clam chowder or

choose a good book to read.

Thanks to all of you who completed *Coastwatch* survey forms. The information was very helpful, and it will guide us as we make upcoming changes in the magazine. Next month, you'll see a difference in *Coastwatch*. Hint: It'll be bigger and better at no extra charge. See you then.

*Kathy Hart, Managing Editor*

## *C o n t r i b u t o r s*

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# Coastwatch

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Halloween is just about here, and it's a great time to dig into North Carolina's spooky store of coastal ghost stories. Read how Joe Baldwin has searched for his head after a deadly train wreck decapitated him more than 100 years ago and how Samuel Jocelyn told his best friend that he'd been buried alive. These and other scary tales about pirates and shipwrecks will tingle your spine. .... 4

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# Coastwatch

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The North Carolina Sea Grant College Program is a federal/state program that promotes the wise use of our coastal and marine resources through research, extension and education. It joined the National Sea Grant College Network in 1970 as an institutional program. Six years later, it was designated a Sea Grant College.

Today, North Carolina Sea Grant supports several research projects, a 12-member extension program and a communications staff.

Ron Hodson is interim director.

The program is funded by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration and the state through the University of North Carolina.

*Coastwatch* (ISSN 1068-784X) is published bimonthly, six times a year, for \$15 by the North Carolina Sea Grant College Program, Box 8605, North Carolina State University, Raleigh, North Carolina 27695-8605. Telephone: 919/515-2454. Fax: 919/515-7095. E-mail: [k\\_hart@ncsu.edu](mailto:k_hart@ncsu.edu). World Wide Web address: [http://www2.ncsu.edu/sea\\_grant/seagrant.html](http://www2.ncsu.edu/sea_grant/seagrant.html). Second-Class Postage paid at Raleigh, N.C.

POSTMASTER: Send address changes to *Coastwatch*, North Carolina Sea Grant, Box 8605, North Carolina State University, Raleigh, NC 27695-8605.

*Front cover photo of a red maple leaf by Scott D. Taylor.*

*Table of contents photo of an archaeological dig by Michael Halminski.*

*Printed on recycled paper.* ♻️

## COASTAL TIDINGS



Illustration by Anne Marshall Runyon

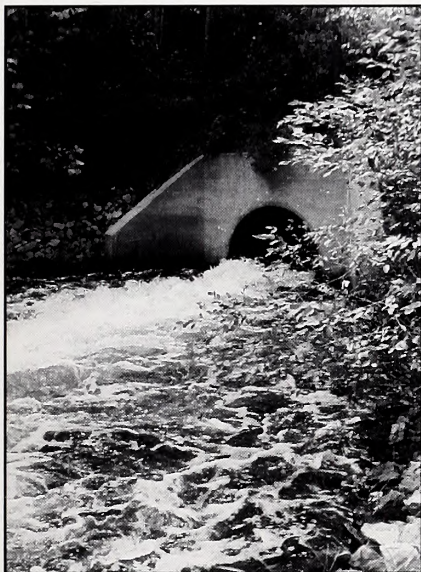
## Saving Diamondback Terrapins

Populations of diamondback terrapins, once abundant in coastal marshes, have declined. Scientists believe the declines have multiple causes: degradation and loss of habitat, road mortalities, increased predation from raccoons and drownings in trawls, nets and crab pots. One scientist has estimated that deaths from entrapment in crab pots could be as high as 20 percent.

To reduce mortalities, Sea Grant scientist Gilbert Grant, a biologist at the University of North Carolina at Wilmington, is developing a terrapin excluder device for commercial crab pots. He will place a wire insert in each entrance of the pot that will allow the short, wide blue crabs to enter but exclude the dome-shaped terrapins.

Grant will test his insert to see how well it prevents terrapin entrapment and to determine its effects on blue crab catches. If all goes well, he could introduce his excluder to fishers. The excluder would add less than 50 cents to the price of a crab pot. More importantly, it could reduce turtle mortalities, keeping diamondback terrapins off the U.S. Fish and Wildlife Service's threatened or endangered species list and eliminating the need for restrictions on commercial crabbing. 📺





## Fall Flowers

The mountains don't have sole claim to fall beauty. North Carolina's coastal marshes and dunes also offer residents and visitors a dose of visual splendor.

Look first at the marshes, says Sea Grant marine education specialist Lundie Spence. Interspersed among the marsh grasses are the delicate, purple blooms of sea lavender. Along upper tidal areas of the marsh, the jointed

fingers of glasswort turn flame red as the cool fall breezes cause the plant's green chlorophyll to break down.

In the dunes, seaside goldenrod is in its glory, and camphorweed, a member of the aster family, dots the back of the dunes with yellow flowers. In the depressions between dune tops, purple muhly catches dew, and the five-petal marsh pink still blossoms. ☐

## Tracing Nutrients

Nutrients drain into coast-bound rivers from point sources such as sewage treatment plants and industrial outfalls and from nonpoint sources such as city streets, farms and forests. Currently, too many nutrients float downstream, and many coastal rivers are becoming overly enriched or eutrophic. The results are algal blooms, dead water zones and fish kills.

Limitations on nutrient inputs are needed, but first scientists must determine the sources and amount of nutrients flowing into rivers. Sea Grant researcher Stephen Skrabel, a chemist at the University of North Carolina at Wilmington, believes dissolved silver may be a tool to distinguish nutrient input.

He'll test the hypothesis that nutrients from industrial sources have low dissolved silver ratios while those from agricultural sources are much higher. Skrabel will use water samples taken from the Cape Fear River to conduct his experiments.

If Skrabel's hypothesis proves correct, dissolved silver may be used as a tracer for nutrient sources. ☐

## Seashells by the Seashore

Although few mollusks live on sandy beaches, the shoreline is a good place to search for empty shells that have washed up. The best time to look is in the fall when hurricane season is in full swing or in early spring after winter storms.

Take a leisurely walk and discover the shapes and sizes of shells scattered at the water's edge. To the average beachcomber, they're interesting and eye-catching, but to early colonists and Native Americans they were much more — certain shells were highly valued as money, jewelry and utensils.

The large, smooth shells of sea scallops were used by early Native Americans as dishes. Today, tourists purchase them to use as ashtrays.

Lettered lives — smooth, shiny, cylindrical shells with a short spire — are named for their dark markings that resemble letters. Colonists and early

Native Americans made jewelry from these shells.

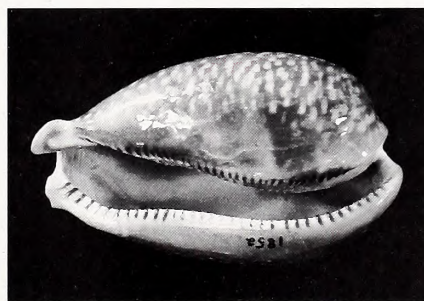
Common Atlantic marginella have a golden brown exterior, usually marked by two or three dark spiral bands. Early Native Americans often crafted necklaces from margin shells and used them in trading.

Atlantic deer cowries are glossy, smooth, thin, elongate

shells with no spire. Early Native Americans used cowries as money in trading, and many cultures used them as religious and fertility symbols.

Hard-shelled clams were a favorite food of early Native Americans, who made beads from the shells' purple edges and used them as money, called "wampum."

The best time to find these and other shells is an hour before and after low tide, especially during spring tides that occur on new and full moons. ☐



Scott D. Taylor

*Atlantic deer cowrie*





# North Carolina's Haunted Heritage

## The Ghosts of Our Coast

*By Jeannie Faris Norris*





Out of thin air the

ghouls and goblins appear this time of year, reminding us to buy candy and costumes for the haunting season. They are the stuff of magic and marketing.

But Halloween also invites a look at the legendary spirits believed to haunt our native shores. The North Carolina coast hosts a tradition of ghost stories about people who died in harrowing shipwrecks, pirate attacks and train crashes. They tell of famous duelers, pirates, captains and soldiers. And they tell of people who led quiet lives but died strange deaths.

*Continued*



# New Bern at Night Ghost Walk

Halloween is show time in New Bern's Downtown Historic District as the annual ghost walk visits the spirits of people who have lived in, visited or otherwise been connected with the historic city.

The New Bern at Night Ghost Walk, now in its seventh year, dramatizes ghostly tales in private homes and on porches in the city's historic district. It also includes a stroll through Cedar Grove Cemetery to visit some of the famous folk buried there. Organizers say some liberties are taken with the tour's dramatizations, but they're as close to the facts as possible.

Tickets are \$11 in advance and can be ordered by check payable to New Bern Historical Society, P.O. Box 119, New Bern, NC 28563. On the day of the tour, tickets cost \$13. For information, call 919/638-8558. ■

The spirits in many of these tales return because they're unhappy about something they lost in life, writes John Harden in *Tar Heel Ghosts*. It could be a life, a love, a friend or a treasure. Some haunt with a purpose and others re-enact their most dramatic moments like a perpetual rerun.

"These North Carolina spirits have righted wrongs, brought criminals to justice, punished wayward husbands, avenged cruel deeds, and even gotten themselves into court records — as active and hardworking as any lot of spooks ever assembled," Harden writes. "They come from, or inhabit, cabins and mansions, boats, trains, trails and mountain recesses."

Rodney Kemp, a history teacher in Carteret County, enjoys the legends from a storyteller's point of view. Ghost stories entertain, and there is an art to sharing them. Well-told, they send hair-raising chills over our skin. And the right atmosphere of candlelit darkness can heighten the suspense and turn our imaginations to ghouls lurking in the shadows.

It's a fascination many of us carry from childhood to old age, Kemp says. "We all like to be surprised and be intrigued. At the same time, people always ask me, 'Is that true?' And I say, 'To a storyteller, it's all true.'"

Ravages of the sea and legends of the Lost Colony are the makings of many coastal ghost stories, Kemp says. For generations, people in isolated coastal communities have repeated these and other tales to entertain themselves.

"Storytelling was popular at the fish house or the community store," he says. "If you told a good one, they'd buy you a Pepsi."

But these otherworldly chronicles do more than entertain. In their telling, they reveal information about our past. They are history — oral accounts of how North Carolinians lived and died.

A good ghost story begins with research to connect the tale with historical fact, says Brooks Newton Preik, author of *Haunted Wilmington and the Cape Fear Coast*. Details about a deadly mishap or a person's life can be verified at the library, in old news accounts or in public records.

"The story is important from a history standpoint, of course," Preik says. "I have to put in enough embellishment to fill in the skeleton of the story. But the history is just as important to me as the story. So for that reason, I elected not to do any stories that I couldn't more or less authenticate historically."

This no-nonsense approach paid off for Preik, whose book has been used in some Wilmington elementary classrooms to teach local history.

"It's important to me for people to understand that these ghost stories are part of our heritage. ... They're still unexplained," she says. "It's important to keep them intact and embellished as little as possible because they are a part of our history."

Of course, some enhancements help an author tell a story well. People like details, so Preik says she sometimes lets her imagination supply information that is consistent with the era. She did this with an often-told story about a Wilmington man who was buried alive.



"I started writing after midnight, and I scared myself," she says. "I got the story playing through my mind like a video. I was alone upstairs, and it was very quiet. I could almost see the things happening in my mind. If you read that story, there is a lot of detail. Yet somehow I felt it was OK in that story because I don't think I took away from history. And I made it a believable thing. I really think that story happened. There's too much of a line of authentication from people back to the eyewitness."

This tale and a few others are told in abbreviated form here. For the full stories — with all of their detail and suspense — dig into the books listed to the right.

**I**t's hard to imagine, but the fear of being buried alive was once quite real. Alexander Hostler and Samuel Jocelyn had been inseparable since childhood. The Wilmington men had grown up together, sharing their thoughts, ideals and aspirations. One summer day in 1810, they were talking with friends about the possibility of returning to Earth after death. The pair maintained that it could be done and agreed that the first to die would reveal himself to the other.

Not long afterward, Samuel set out for a horseback ride alone and was found unconscious in the road a few hours later. All attempts to revive him failed, and he was pronounced dead. Two days later, he was buried. Alexander was inconsolable. One night shortly after the burial, he was overwhelmed by the appearance of his friend, who said, "How could you let me be buried when I was not yet dead?"

Shocked, Alexander convinced himself that he had imagined Samuel's appearance. But the following night, the same thing happened. Again, he said nothing to anyone. When the third successive night brought the same occurrence, he decided to investigate. He told a friend what had happened, and the two went to Samuel's grieving parents for permission to exhume the body. Complying with the parents' wish that the exhumation be as private as possible, the two men dug up the coffin at midnight. When they removed the lid, they saw that Samuel's body was lying facedown. There was evidence of a brief but frantic struggle in the coffin that had actually loosened one side. Their friend had died of suffocation. His fall from the horse had brought on a comatose state that had convinced everyone he was dead. And they would never have known otherwise had Samuel's ghost not appeared to Alexander.

— *Tar Heel Ghosts*

**S**ories about ghostly appearances on the water arise from the many tragic shipwrecks and pirates' raids along the North Carolina coast.

*Continued*

## Ghostly Page- Turners

Check out these books at your local library or bookstore or call the publisher for more information.

- *Ghosts of the Carolinas* by Nancy Roberts. The University of South Carolina Press, Columbia, S.C. 800/768-2500.

- *Ghost Stories of Old New Bern*. Published by New Bern Historical Society Foundation, New Bern, N.C. 919/638-8558.

- *Haunted Wilmington and the Cape Fear Coast* by Brooks Newton Preik. Banks Channel Books, Wilmington, N.C. 910/762-4677.

- *Supernaturals Among Carolina Folk and their Neighbors* by F. Roy Johnson. Out of print.

- *Tar Heel Ghosts* by John Harden. The University of North Carolina Press, Chapel Hill, N.C. 800/848-6224. ■



On the night of Dec. 30, 1812, a small boat sailed out of the harbor at Georgetown, S.C. Aboard was Theodosia Burr Alston, the young wife of Gov. Joseph Alston. She was going to New York to visit her father, the notorious Aaron Burr. The onetime vice president of the United States had been the victor in a fatal duel with Alexander Hamilton, his political enemy. Following the duel, Burr was arrested and tried for treason. He was acquitted, but feelings ran so high against him that he moved to France for four years. In 1812, his daughter convinced him to return. He waited anxiously for her ship to meet him, but it never arrived.

Many years later, two criminals awaiting execution in Norfolk, Va., swore they'd been among a pirate crew that had captured the boat and forced everyone aboard to walk the plank. Another crew member later claimed to have been haunted for years by the memory of a beautiful young woman who pleaded for her life so that she could visit her father in New York.

Some think that Theodosia was taken ashore by pirates at Smith Island (now Bald Head), where she drowned after dashing into the ocean. The guards were said to have been hanged for her escape, and their ghosts are seen at midnight on the island searching for their captive.

During World War II, two Coast Guardsmen were patrolling the Bald Head beaches when they saw a woman in a long flowing dress disappear into thin air. She reappeared several nights later, and a guardsman fired his gun. The bullet seemed to pass right through her.

An old fisher told the guardsmen who she was. At the beginning of the war, he had seen her crying and pointing to the sea. The next morning, they found a wrecked tanker that had been hit by an enemy torpedo. The fisher believed Theodosia was giving a warning, perhaps in an effort to prove that Burr family members were patriots and not traitors.

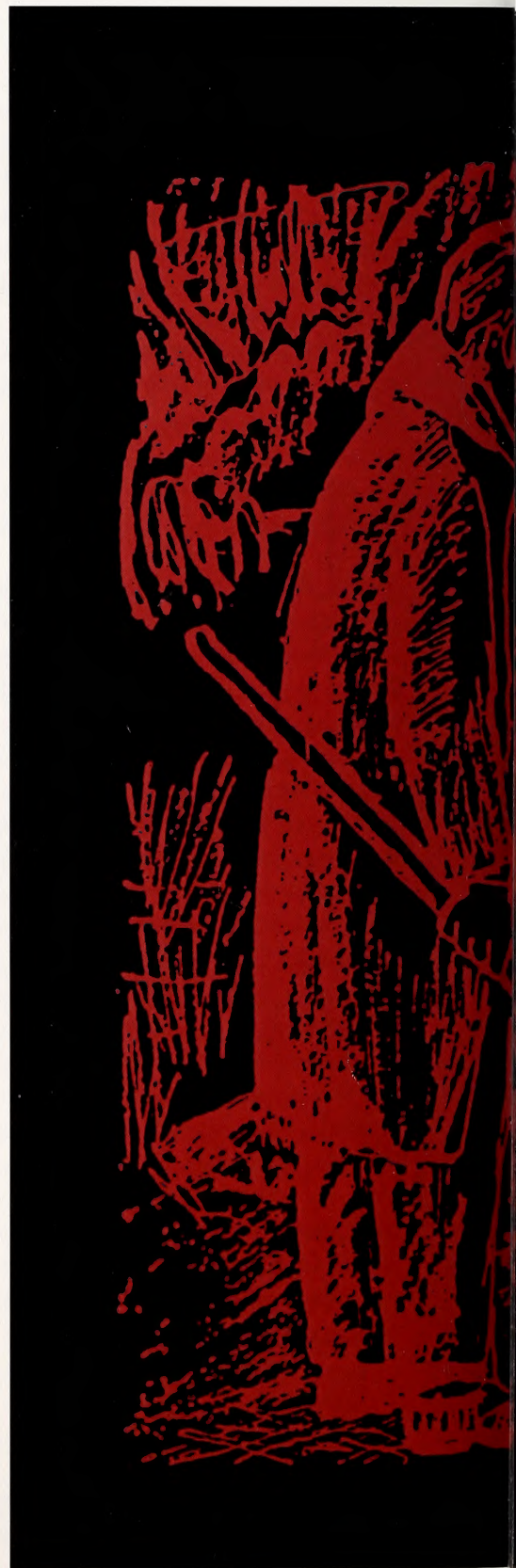
Such stories of Theodosia have persisted for 200 years.

— *Haunted Wilmington and the Cape Fear Coast*

**I**n 1882, three Italian-immigrant street musicians left New York for Wilmington in search of a better life. Among them was harpist Antonio Caseletta, who brought along his young wife and child. The musicians were penniless but optimistic about their future — and with good cause. A local captain helped them find work at Hotel Brunswick in Smithville (now Southport), a place popular with summer guests for its music and dances. The trio did well and often stayed at the waterfront inn because of the late hours they worked. But Tony made frequent trips back to Wilmington to visit his wife and child, who still lived there.

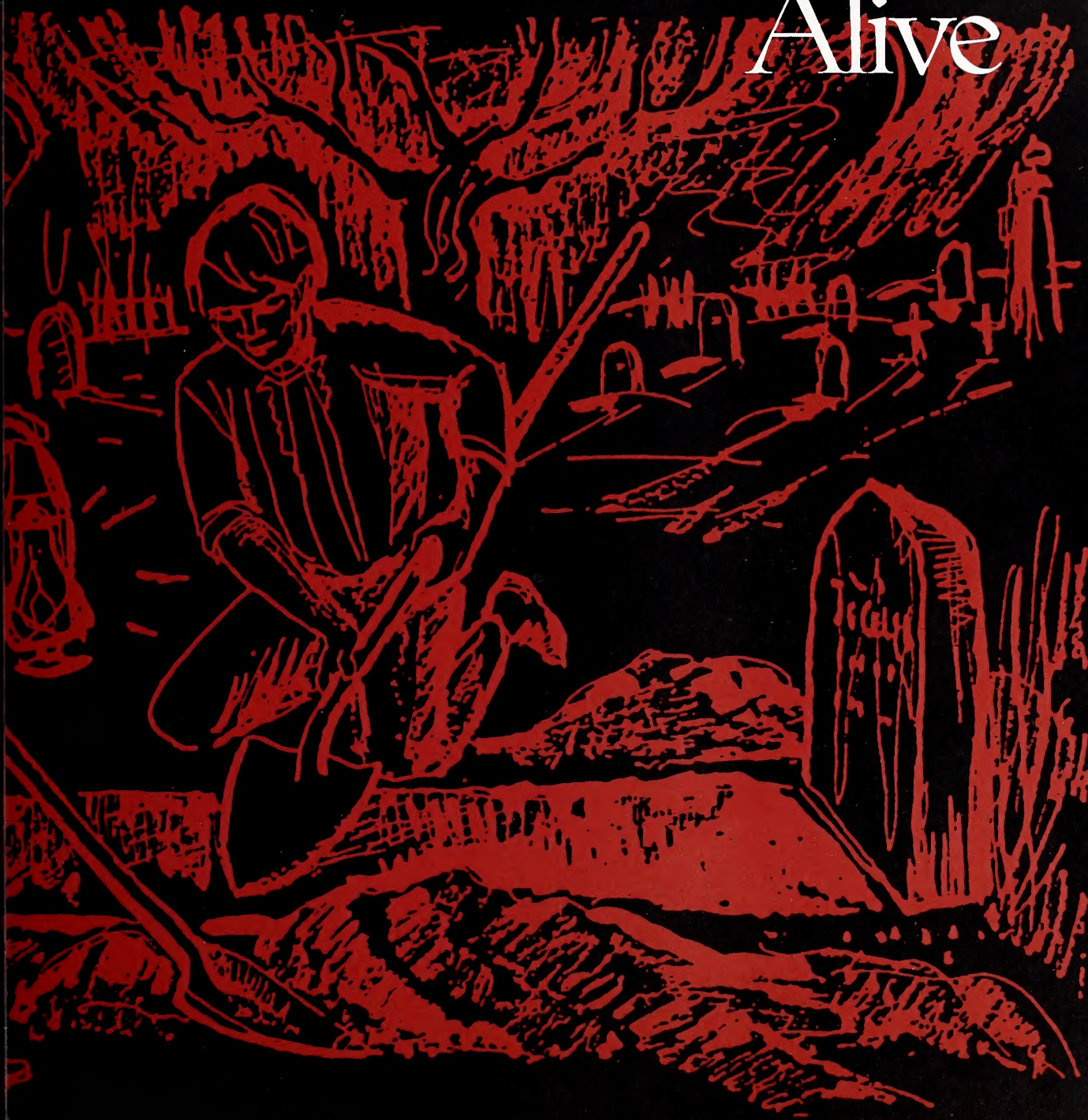
On the morning of April 23, according to a newspaper account, Tony kissed

*Continued*





# Buried Alive





Maco

Light







his family good-bye at the dock in Wilmington and headed for Smithville. That afternoon, with some time on their hands, the musicians took a sail around Bald Head Island. The weather was nice and the boat was in good shape, so there was no explanation for what happened: The boat sank, and Tony drowned.

That should have been the end of the story, but it was just the beginning. Local lore says that Tony returned, perhaps because he was only 19 when he died or because of his attachment to the harp that he played so beautifully. For as long as anyone can remember, he has played his harp in the inn where he worked.

People who have lived there report hearing music and footsteps throughout the house. One resident, Mary Stuart Callari, describes the music as “melodic in a strange way. It sounds like a tune, though nothing you could hum. It is rather metallic. When you hear it and follow the sound to where you think it is — it is no longer there. It always sounds off in the distance.”

Tony doesn’t show himself, but he makes his presence known through his actions. Callari, whose family bought the property in 1949, says her first experience with Tony was in the 1950s when she was in high school. As she approached the dark house alone one night, the lights began to turn on room by room even though no one was home. Tony has also closed windows during storms and covered sleeping children with blankets.

— *Haunted Wilmington and the Cape Fear Coast*

**I**n North Carolina, it’s hard not to have heard of the Maco light. The 130-year-old legend says that the ghost of a train conductor walks the rails at the old Maco Station just 14 miles west of Wilmington.

The Maco Station ghost light goes back to 1867, when Joe Baldwin was a train conductor. He was riding one night in a rear coach when it uncoupled from the train. Another locomotive was following, and Joe feared that it would plow into the free car. So he hurried to the rear platform, grabbed a signal lantern and waved it frantically. The approaching engineer never saw the light or the coach, colliding with such a force that the car was destroyed. Joe was decapitated.

A witness said that Joe’s lantern waved until the last second and was hurled away from the tracks into a swamp. There, it continued to burn until it was moved.

Shortly after this fatal accident, a mysterious light showed up along the tracks, and it has been appearing there over the years. Legend holds that it’s Joe looking for his head. Folks who visit the tracks say the light materializes about a mile away as a flicker over the left rail. Then it grows brighter and creeps up the track. As it gets closer, it gains momentum and dashes at a great speed at the same time swinging faster from side to side.

Then, it stops about 75 yards away, glows, speeds backward and vanishes. ▣

— *Tar Heel Ghosts*









A HISTORIAN'S COAST

# The Smoke and Ashes of Croatan

*By David Cecelski • Photos by Michael Halminski*

At least a thousand years before the English landed at Roanoke Island, the Algonkians lived along our tidewater and Outer Banks. Their relics are everywhere. I find their pottery shards in freshly plowed corn and cotton fields. I stumble upon their arrowheads by the edges of creeks and bays. I see their architectural handiwork in the Crossing Path at Mill Creek, Shell Point at Harkers Island, the Old Indian Canal at Turnagain Bay.

*Continued*



**T**hese last traces of the Algonkian past have been threatened by coastal development. Strip malls, highways and golf courses have granted them no asylum. Fortunately, a new wave of archaeological research, much of it led by David Phelps at East Carolina University, offers a crucial chance to deepen our understanding of coastal Native Americans before bulldozers literally scatter the last of their bones.

Recently, I joined Phelps at one of the most important archaeological digs: the legendary village of Croatan. Four years ago, Hurricane Emily's 12-foot tidal swell exposed a section of an Algonkian village in a dune ridge at Buxton on Hatteras Island. That dune ridge had been identified by archaeologist William Haag in 1956 and again by Phelps in 1983 as the likely site of the Croatan chiefdom's capital. So far, eight archaeological sites have been discovered at Hatteras Island, including an ossuary — a mass burial — of the Algonkian nobility.

First charted in a map by English surveyor John White in 1586, the Croatan chiefdom stretched from present-day Buxton south to Ocracoke Inlet. The capital village, also known as Croatan, was located by an old inlet (called Chacandepeco) that cut through the island immediately north of Cape Hatteras. It was one of the few places on the Outer Banks with a maritime forest extensive enough to safeguard an archaeological site from the region's winds and storms.

The shelter of Buxton Woods also explains why Croatan was the only Algonkian chiefdom with a capital village on the Outer Banks when the English first arrived. The Croatans had good soil for their cornfields, orchards and gardens; ample forest for fuel and hunting; and certainly no shortage of fish and shellfish. Phelps estimates that as

many as 5,000 people lived in the chiefdom.

The Croatans played a key role in English/Native American diplomacy during the Roanoke voyages of 1584 to 1587. Most famously, Croatan may have been the destination for the Lost Colony, the first effort by the English to colonize North America. When the colonists disappeared from Roanoke Island in 1587, they left only one clue of their whereabouts: a gatepost carved with the word "Croatoan."

The fate of the Lost Colony has been argued heatedly for years. No wonder that when Phelps concluded (using geological records and 16th-century maps) that the Buxton site was almost certainly Croatan, scholars and journalists worldwide began to speculate about whether the Lost Colony had finally been found.

Even though I have never participated in an archaeological dig, Phelps, his ECU assistants and a devoted group of Buxton volunteers welcomed me with a warm hospitality. Then they handed me a shovel and put me to work. For two days, I dug in a live oak glade along a sandy ridge by Pamlico Sound. I sliced through wax myrtle and poison ivy roots with a razor-sharp shovel, then dug several feet deeper into the sand. Working on my hands and knees, I gently removed layers of soil an inch or two at a time with a tiny trowel, as the ECU archaeologists taught me. Then we sifted the soil for fragments.

The earth has not forgotten the Algonkians. Deep under matted roots and barren sand, Croatan has been imprinted into a layer of dark, shell-laden midden 18 inches thick. We

found copper beads and pipe stems, stone flakes and tools, shell piles and deer bones (ancient garbage), and shards of

Colington-period (800-1650 AD) pottery that was coiled, pressed and tempered with oyster shell. Dark shadows reveal where posts once supported village buildings.

We also unearthed European relics: lead shot, gun flints, nails, Delphic pottery. These artifacts, like the Algonkian remains, date from the early colonial period, roughly 1650 to 1715, several generations after the Lost Colony. They had probably been used as trading items between the English and Croatans.







Several days after I left Buxton, the ECU investigators found English farthings (copper coins) dating from the 1670s. Holes were drilled through them, a sign that the Croatans used the coins for decoration, not money. They were found along with bird bone rings and strong evidence that the Croatans were manufacturing lead buckshot. Phelps' team found iron tools for molding the shot and hundreds of hardened puddles of lead.

Phelps would be pleasantly

*Continued*











surprised — maybe stunned — if his ECU team actually finds evidence of the Lost Colony. Like most historians, he believes the forsaken colonists traveled to southern Chesapeake Bay. There, they met an untimely demise at the hands of the Powhatans, the powerful confederacy headed by Pocahontas's father. This is the story told by the Jamestown colony's secretary William Strachey, writing in his *Historie of Travell into*

*Virginia Britania* in 1612.

The colonists may have gone to Croatan briefly, however. Manteo, one of two Native Americans who visited London with Sir Arthur Barlowe in 1584, was a Croatan, and his mother was head of the Croatan chiefdom. Manteo aligned with the English when other villages — Aquascogoc, Dasemunkepeuc and the Secotan — joined forces against the Roanoke colonists in 1587. Having treated the Native Americans harshly during their brief sojourn at Roanoke, the English

had very few native friends or allies. It would not be surprising if they looked to Croatan for temporary sanctuary.

Even if Phelps doesn't solve the mystery of the Lost Colony, the Croatan dig promises to cast piercing new light on more interesting mysteries about the coastal Algonkians and their 17th-century encounters with the English.

The English had little presence in North Carolina for 60 years after the Roanoke colonists disappeared. After 1650, however, the English pushed the colonial frontier south from Virginia. Conflicts arose quickly between the natives and newcomers over hunting, fishing, grazing and land rights.

Early on, the Algonkians and their Iroquoian neighbors successfully resisted English intrusions. On the eve of the 18th century, they still outnumbered the European colonists. But they soon succumbed to smallpox, influenza and other Old World diseases. The Algonkian chiefdoms had all been destroyed or subjugated by English forces by the end of the Tuscarora War of 1711-1713.

Only the broadest outlines of these Native Americans' final reign can be detected in historical documents, and we know nothing from their point of view. The coastal natives had been annihilated in six decades, between 1650 and 1715, and archaeological digs such as the one at Croatan are the only way we'll ever learn more about them.

The Croatan capital died too. In its heyday, the village stretched at least half a mile. But when English surveyor John Lawson published his *New Voyage to Carolina* in 1709, he reported only "16 fighting men" at Croatan (by then known as Hatteras). In 1733, Edward Mosely made the last known reference to natives at the

Croatan site. On a North Carolina map published in London, he scribbled "Indians, none now inhabiting the See Coast, but about 6 or 8 at Hatteras."

During my visit to Buxton, I talked late into the nights with the ECU archaeologists. On those warm summer evenings, Phelps unfurled vivid imaginary maps of the Croatan capital. Listening to him, I could envision the bustling village. I pictured long houses covered with reed and grass mats scattered along the inlet, broad cornfields tangled with squash and bean vines, elegant fish weirs in Pamlico Sound and Croatan boatmen crisscrossing the sound to trade with distant English and native villages.

We also talked about history and archaeology, the smoke and ashes of our past. At the Buxton dig, I was struck by how patiently the archaeologists worked. They toiled with painstaking rigor, an inch at a time. They seemed burdened by the knowledge that they, unlike historians, have but one chance to retrieve the past. To an archaeologist, the earth confides its mysteries only once. After the ECU team has dug, sifted, sorted, classified and refilled the Croatan site, it can never be studied again. The work can't be hurried and must be done right the first time.

It is a duty I don't envy. For now, as new construction lays claim to coastal lands, there is no time for patience. ■

**D**avid Cecelski is a historian at the University of North Carolina-Chapel Hill's Southern Oral History Program and a regular columnist for *Coastwatch*.





# Venus' Flytrap:

## North Carolina's Own Predatory Plant

By Odile Fredericks

Every now and then you come across an oddball. An individualist who forces you to rethink how the world works and fires your imagination.

For at least the past 200 years, such a creature has lived quietly in the swamps of coastal North Carolina. Naturally occurring nowhere else on the planet, it lives within a 50- to 75-mile radius of Wilmington. The Venus' flytrap is the stuff that horror stories are made of — a plant that bites back.

The inspiration of B-movies such as *Little Shop of Horrors*, Venus' flytraps have long been thought to inhabit tropical jungles, a misconception fed by rumors centuries old.

"For a long time, early explorers came back with fantastic stories of man-/woman-eating plants," says Robert Gardner, a curator with the N.C. Botanical Garden in Chapel Hill. "They probably sowed the seeds, so to speak, of carnivorous plants being from exotic places. Some people even think it's from Venus — that is a far-off place!"

The age-old fascination revolves around a plant that refuses to act like

one. The Venus' flytrap does not need to capture insects because it photosynthesizes, but it snaps them anyway.

In the nutrient-poor soils of its home in the bogs and savannas, bugs provide that little something extra.

"Anything it catches is used as a vitamin supplement," Gardner says. "It won't die without insects, it just prospers a little better."

### DID YOU KNOW?

*The flytrap is activated only after the second stroke to its trigger hairs, preventing raindrops or debris from springing it shut.*

*Some say that the flytrap not only has a memory but knows how to count.*

Although other flesh-eating plants such as pitcher plants and butterworts have more passive or gradual methods of ensnaring their prey, Venus' flytraps act instantaneously, says Marj Boyer, a botanist with the N.C. Department of Agriculture, which monitors the plant.

"This is the most active of carnivorous plants," she says. "The Venus' flytrap is the only one you can really see in action."

Charles Darwin himself thought them irresistible for their movement — a plant that seemed to bridge the evolutionary gap. He performed experiments on them, declaring them one of the world's most wonderful plants, says Mike Dunn, coordinator of teacher education for the N.C. State Museum of Natural Sciences in Raleigh.

Discovered in North Carolina in 1760 by Gov. Arthur Dobbs, the Venus' flytrap has been researched more recently in Germany for possible cancer-fighting properties thought to lie in its digestive enzymes.

The plant captures its prey in a manner that recalls a medieval torture chamber. The traps are leaves that look like partially opened clam shells fringed by trigger hairs. Unsuspecting

insects that wander inside — perhaps enticed by nectar or the red color that some traps sport — may stroke a hair and take no notice. Their second touch, however, spells doom. The trap clamps down, hairs overlapping like the steel teeth on an animal trap. The spines hold larger insects in, allowing smaller ones to escape.

If suitable prey remains, the plant gradually closes, crushing the insect and

*The N.C. Botanical Garden in Chapel Hill has Venus' flytraps on display, and they will be featured in the expanded Museum of Natural Sciences in Raleigh, scheduled to open in June 1999.*



sealing it into a digestive vat. After drowning the victim and absorbing its nutrients, the trap reopens, allowing the undigested remains to blow away. A trap wears out after one to four live meals, when the leaf turns black and dies. A trap that captures nothing can close up to 10 times, reopening in 24 hours each time.

Contrary to its name, research shows that only 2 percent of the plant's prey are flies, with 90 percent of its captives coming from the ant, beetle and spider kingdoms, and the rest dubbed miscellaneous, Gardner says.

"Maybe it should be more accurately called the Venus' ant trap," he observes.

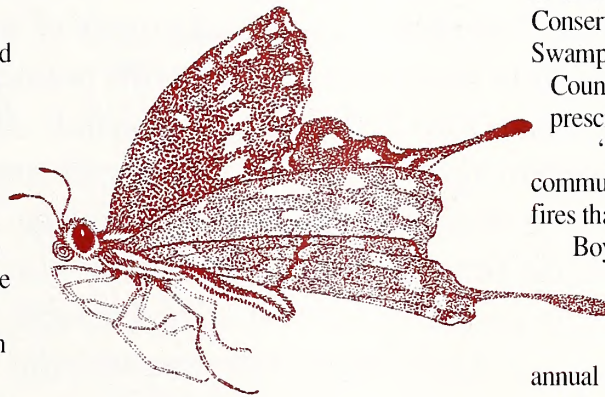
The diversity of prisoners found in the traps rules out the possibility that the plant has one lure.

"No single attractant could bring in spiders, beetles and ants — they don't even belong to the same kingdom," he says. "The one thing that all their captives have in common is that they are all ground-dwelling, hopping, crawling animals and that they just happen to wander into these traps."

Most victims are those that walk the earth as opposed to fly, agrees Dunn, who says the weirdest sight he's seen in a trap was a young green lizard.

"That's pretty unusual, but it looked dramatic," he says. "Half its body was trapped inside, and it died."

Such amazing feats conjure up images of huge plants, but a mature Venus' flytrap is no more than 4 to 5 inches tall. And despite its ferocious reputation, the plant itself is vulnerable, worthy of a legal designation of "special concern" in North Carolina. Loss of habitat is the main reason it is now rare in the wild, with poaching a lesser contributor.



By law, Venus' flytraps cannot be collected from public property. On private land, they cannot be removed without the landowner's written permission. Anyone interested in buying them should look for nurseries that artificially propagate them.

In the wild, man-made drainage and fire suppression have diminished their homes. But Venus' flytraps thrive in areas such as The Nature Conservancy's 16,000-acre Green Swamp Nature Preserve in Brunswick County, kept in a natural state by prescribed burnings.

"The Venus' flytraps live in a community maintained by natural fires that clear out the underbrush," Boyer explains.

The fact that North Carolina is second in the nation only to Florida in annual numbers of lightning strikes — which often cause fires — could help explain why the plant likes it here, says James Ward, a curator with the N.C. Botanical Garden. The indigenous peoples who once lived here also may have unknowingly nurtured its habitat through their use of fire, he says.

Whatever the reason, one wonders why such an oddity chose to live in only this part of the world. Was it the perfect spot where fire and water met? Or did it evolve here as a plant that knew how to make the best of poor conditions?

No one knows.

As Boyer puts it, the question on people's minds is, "How can something so exotic-looking and exotic-acting be right at home here?" ■

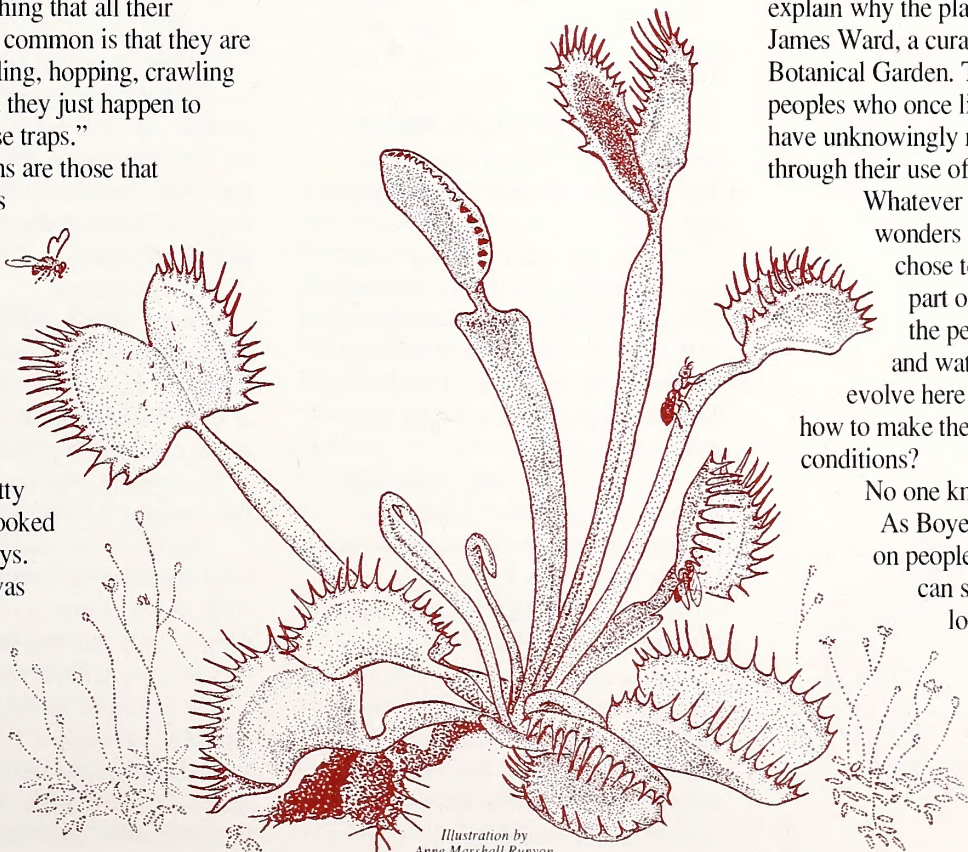


Illustration by  
Anne Marshall Runyon



# Clam Chowder — *A Spoonful of History*

*"But when that smoking chowder came in. ...  
Oh! sweet friends, hearken to me. It was made of small juicy clams,  
scarcely bigger than hazel nuts, mixed with pounded ship biscuits,  
and salted pork cut up into little flakes! The whole enriched with butter,  
and plentifully seasoned with pepper and salt.*

*Our appetites being sharpened by the frosty voyage, and in particular,  
Queegueg seeing his favorite fishing food before him, and the chowder  
being surpassingly excellent, we despatched it with great expedition."*

— Moby Dick, Herman Melville

*By Kathy Hart*

Whether in fiction or reality, a steaming bowl of clam chowder is a satisfying way to quell your hunger on a chilly day.

Along the North Carolina coast, clam chowder is a water-based mixture of clams, potatoes and onions flavored with salt pork. To make the chowder even more hearty, native coastal cooks often rim the chowder pot with corn-meal dumplings.

The word "chowder" is derived from the French word *chaudière*, meaning large caldron. Food historians believe that French fishers often contributed their catch to large community *chaudières* for all to eat.

Most chowders contain fish or shellfish, with clam chowder being the most well-known. But the term "chowder" can be applied to any thick, rich soup containing chunks of food (for example, corn chowder).

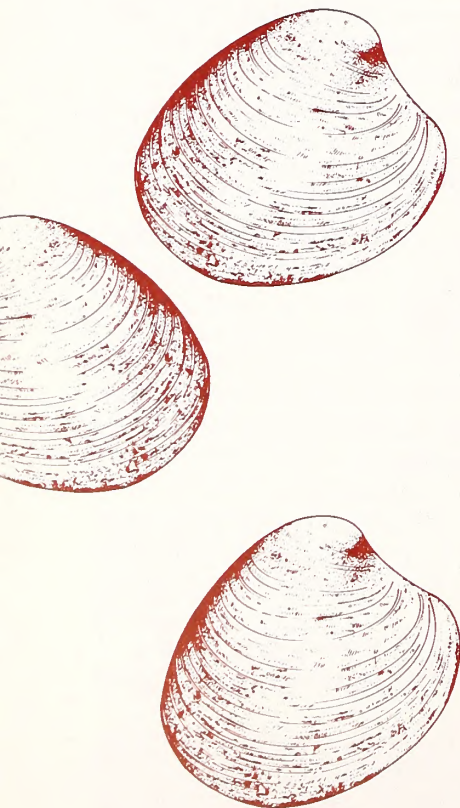
By the mid-18th century, the British were concocting chowders. The thick seafood stew had become a mainstay for shipboard meals, and it's thought that sailors introduced chowder to the people of Newfoundland, Nova Scotia and New England.

But maybe not.

Native Americans also cooked seafood-based soups. John Bartram described this chowderlike dish served at an Iroquoian feast in 1743: "This repast consisted of ... Indian corn soup, or thin hominy, with dry'd eels and other fish boiled in it."

It's likely that seafood chowders were ubiquitous to coastal areas worldwide, and it matters not who originated them — only that they persisted so that we can enjoy the rich soups today.

In its earliest use in America, chowder was made of fish, onions, ground biscuits and water. The first recipe for chowder, flavored with spices, herbs and wine, appeared in rhyme in





1751 in the *Boston Evening Post*. Amelia Simmons, in the second edition of her *American Cookery* in 1800, gave a recipe in which fish, pork and crackers were fried.

When it came to cooking clam chowder, regional differences emerged.

In New England, clam chowder is white and made with clam juice or with chicken or fish stock thickened with cream or milk. It's enriched with potatoes, onions, butter and generous dashes of salt and pepper. Oyster crackers, the modern-day version of the crumbled biscuits, are sprinkled liberally on top.

Farther south, cooks nixed the cream but added tomatoes and additional spices and vegetables, such as carrots and celery. This reddish rival was called Manhattan clam chowder, although it's debatable whether the recipe originated in New York City.

In North Carolina, cooks said no to tomatoes and cream, opting for simplicity and a less muted clam flavor. In fact, the recipe favored by Tar Heel coastal cooks varies little from the chowders stirred together 250 years ago by ship's cooks crossing the Atlantic in wind-driven vessels. Again, the isolation of North Carolina's barrier islands serves to preserve a tradition — one rich in flavor.

### Down East Clam Chowder

- 1 quart coarsely chopped clams
- 1/4 pound salt pork, sliced
- 1 quart water
- 1/2 cup chopped onion
- 1 teaspoon salt
- 1/4 teaspoon freshly ground black pepper
- 4 cups diced potatoes
- 1 cup mashed potatoes for thickening (optional)

In large saucepan, fry pork over medium heat until crisp. Remove pork and discard. Add clams, water, onion,

salt and pepper. Bring to a boil. Reduce heat and cook slowly until clams are tender, about 1 1/2 hours. Add potatoes and onion, and cook until potatoes are done, about 20 minutes. Add mashed potatoes and simmer until thickened, about 5 minutes. Serves 8 to 10.

— North Carolina State University Seafood Laboratory

### Manhattan Style Clam Chowder

- 1 quart coarsely chopped clams
- 4 bacon strips
- 2 cups chopped carrots
- 1 1/2 cups chopped celery
- 2 cups chopped onion
- 1/2 cup finely chopped green pepper
- 1 tablespoon minced garlic
- 1 teaspoon salt
- 1/4 teaspoon freshly ground black pepper
- 1/8 teaspoon cayenne pepper
- 1 teaspoon thyme leaves
- 1 bay leaf
- 1 quart water
- 1 can tomatoes, chopped and undrained
- 4 cups diced potatoes
- 1 cup finely chopped fresh parsley

Fry bacon in large pot over medium heat. Remove bacon and discard. Add carrots, celery, onion, green pepper and garlic. Sauté lightly. Add salt, black pepper, cayenne, thyme and bay leaf. Add water, tomatoes and clams. Bring to a boil. Reduce heat and cook slowly until clams are tender, about 1 1/2 hours. Add potatoes and cook until done, about 20 minutes. Stir in parsley just before serving. Serves 8 to 10.

— North Carolina State University Seafood Laboratory

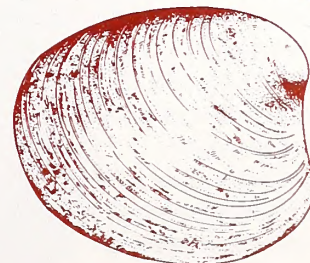
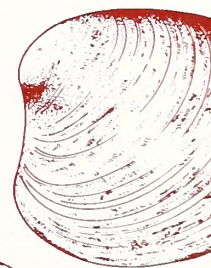
### New England Clam Chowder

- 1/4 pound salt pork, cubed
- 3 medium onions, chopped
- 2 large potatoes, peeled and diced
- 4 cups coarsely chopped fresh clams
- 2 cups clam liquor\*

- 4 cups milk
- 2 cups medium cream
- freshly ground black pepper to taste
- 3 tablespoons butter
- oyster crackers

In a large saucepan, sauté salt pork over low heat. Add onions and sauté until they soften. Add potatoes and water to cover and cook until they are tender. Add clams and liquor; cook 5 minutes. Add milk and simmer 5 minutes longer. Do not boil. Do not overcook because clams will toughen. When ready to serve, add cream. Heat through but do not boil. Season with pepper. Serve in bowls with a pat of butter and oyster crackers on top. ■

\* Clam liquor is the juice of clams.





# The Nature of the Coast in Fact and Fiction

*From the unfamiliar mysteries of nature to a mystery of a familiar nature, our book market offers a few reading choices for cool autumn nights.*

By Daun Daemon

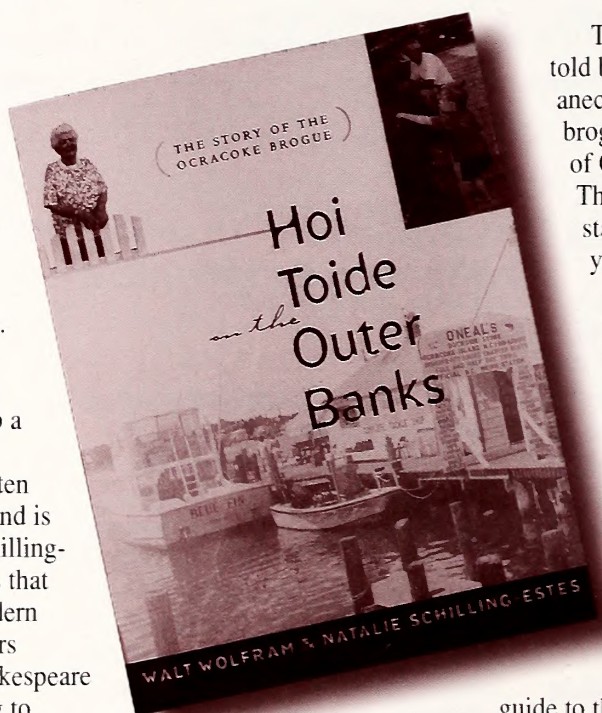
## • Language

***Hoi Toide on the Outer Banks: The Story of the Ocracoke Brogue*** by Walt Wolfram and Natalie Schilling-Estes. The University of North Carolina Press, P.O. Box 2288, Chapel Hill, NC, 27515. 165 pages. Hardcover, \$29.95. Paperback, \$14.95. ISBN 0-8078-4626-0.

Folks at the coast need not hop a ship to the British Isles to catch an earful of brogue, but they better listen fast — the brogue of Ocracoke Island is fading. Linguists Wolfram and Schilling-Estes trace the historical influences that gave rise to the dialect and the modern forces that erode it now. The authors examine impacts ranging from Shakespeare to Irish settlers, commercial fishing to tourism. By the end of the history lesson, the reader has a good feel for how languages evolve.

The authors are most engaging when they slough their scholars' skins and talk to readers as they would a group of native islanders at Albert Styron's General Store. Their descriptions of the dialect's elements will help any *dingbatter* be less *quamished* about *saying a word* with an *O'cocker*. That is, the book can act as a guide for outsiders who might feel a little queasy about chatting a while with an Ocracoke native.

A glossary of terms in the second chapter and pronunciation guides throughout are helpful, and a vocabulary quiz tests your brogue skill. If you score high, you're an "island genius."



The last chapter consists of stories told by several O'cockers. Though the anecdotes have little to do with the brogue, they offer a poignant glimpse of Ocracoke life in days gone by. These humorous reminiscences will stay clear in your mind long after you've shelved *Hoi Toide*.

## • Nature

***The Nature of North Carolina's Southern Coast: Barrier Islands, Coastal Waters, and Wetlands*** by Dirk Frankenberg. The University of North Carolina Press, P.O. Box 2288, Chapel Hill, NC, 27515. 250 pages. Paperback, \$17.95. ISBN 0-8078-4655-4.

Frankenberg's latest guide to the North Carolina coast focuses on the natural areas from the Outer Banks to South Carolina, including the White Oak River, Brunswick County and Topsail Island. His previous guide, *The Nature of the Outer Banks*, covered the northern barrier islands.

In the book's first part, Frankenberg discusses the geologic background, coastal processes and habitats, and natural plant communities of the region. Crisp line drawings of common plants and a text that is scientific but not too technical help him educate the reader about the coast's ecological communities.

Part two is a clearly written guidebook on how to access and enjoy the beauty and wildness of the coast's natural areas. Frankenberg divulges what he considers five-star sites — among them Bear Island, Stump Sound and



Fort Macon State Park — all representatives of their natural communities as well as interesting places to visit.

In the epilogue, the author briefly discusses a number of important issues facing the coast: population, land use, economic development, water quality, environmental management and coastal management. He provides just enough information to pique your interest and send you on your way with his guide in hand to discover the issues — and the coast — for yourself.

### • Fiction

*Amethyst Dreams* by Phyllis A. Whitney. Crown Publishers Inc., 201 East 50th St., New York, NY 10022. 276 pages. Hardcover, \$25. ISBN 0-517-70759-4.

The disappearance of Susan Trench, a young heiress from Topsail Island, provides the impetus for mystery master Whitney's latest book. When college friend Hallie Knight is summoned from California by Susan's wealthy grandfather, her arrival sets in motion events that uncover Susan's fate. Hallie, preoccupied by the possible breakup of her marriage, tells the story through her own emotional filter. On Topsail Island, she sets out to determine not only the truth about Susan but her own heart as well. Along the way, she meets an assemblage of people — including a precocious 10-year-old girl, a reclusive artist and a famous actress — who help her sort out both.

Whitney, who spent time on Topsail researching the novel, enlivens the tale with tidbits of history and folklore, weaving in historical details from World War II and beliefs about the mystical powers of amethysts. The island setting is both enchanting and ominous — the surrounding waters lend the sense that a murderer is trapped on Topsail and can't escape the truth's surfacing. It does, in a surprising ending.



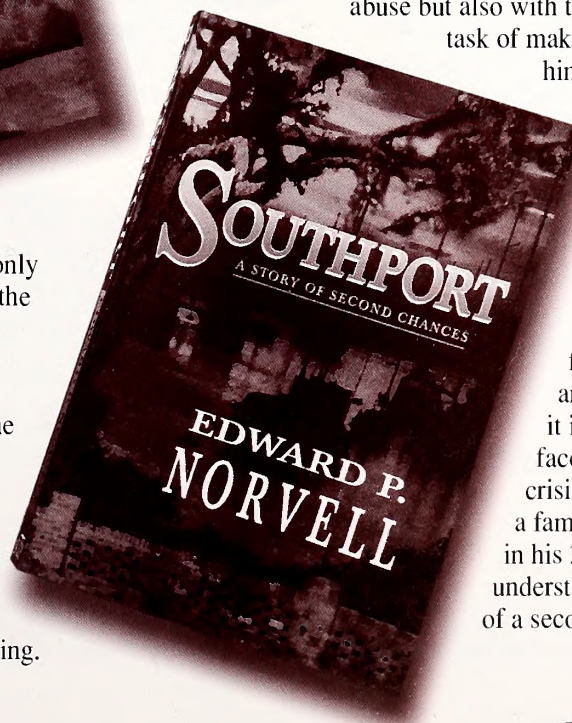
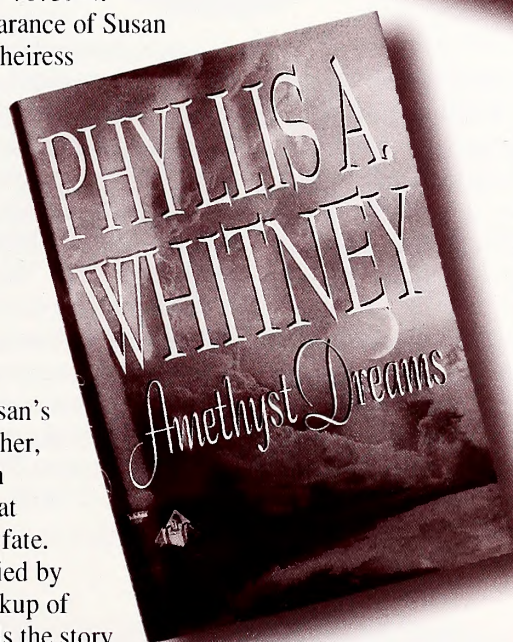
### *Southport: A Story of Second Chances* by

Edward P. Norvell. Research Triangle Publishing, P.O. Box 1130, Fuquay-Varina, NC, 27526. 255 pages. Paperback, \$12.95. ISBN 1-884570-68-2.

When Todd Field runs away from his family's Duplin County tobacco farm in 1975, he heads for the coast and lands in Southport. Soon after arriving, he is hired as a mate on a charter fishing boat, beginning a life of self-discovery and adventure at sea. The reader is taken along on fishing expeditions and seashore walks, through shipwrecks and hurricanes, and into the nightlife of the Carolina coast. Through it all, Norvell provides often magical descriptions of the coastal landscape, particularly of a moonlit turtle hatching on Bald Head Island.

Todd tells his story in a simple and honest voice and is a likable character who transforms from a teen-ager adrift to a man solidly grounded. Early in life, he must deal not only with the lasting damage of abuse but also with the enormous task of making a way for himself with few resources.

He is offered many second chances for love and respect — from others and himself. But it isn't until he faces a personal crisis after starting a family that Todd, in his 30s, fully understands the virtue of a second chance. ■





# Seeing Spots and Specks

By Daun Daemon

Veteran anglers know that fall is a prime time to cast a lure. Whether you prefer to jostle for position on a pier, stake out your territory on the sand or relax in your trusty fishing boat, the cooler temperatures and less crowded beaches create near perfect conditions for angling.

This season, two abundant species are speckled trout and spot. Jim Bahen, North Carolina Sea Grant marine extension agent, has some tips for reeling in these fish.

## SPECKLED TROUT

Also called spotted sea trout and specks, speckled trout are found in North Carolina waters year-round. Because they feed most actively in water temperatures ranging from 50 to 65 F, cast for them in North Carolina from October through December. They

can be caught in the surf or from a pier or boat in the ocean or estuary.

• **Surf fishing:** Hit the beach in the early morning or late evening at low tide and fish as the water rises. Look for a slough, an area of deeper water inshore of the outer bar, and fish that area. To find a slough, look for quiet surf with

few breaking waves. Trout will wait in the slough for the bait species — especially shrimp and minnows — that travel in shallower water.

• **Pier fishing:** Select your place on the rail in the early morning or in the evening into the night. The catch will be best after dark because artificial lights attract bait species to the pier. Fish behind the breakers with artificial lures.

• **Boat fishing:** Fish in a tidal creek during a falling tide. Trout will wait in the mouths of the creeks and deep holes

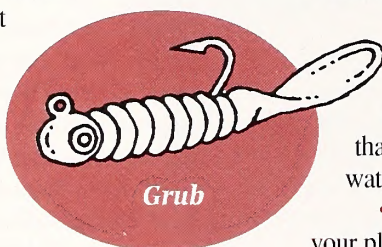
to ambush species as they leave the shelter of the shallows. Trout also tend to stay tucked in or behind eddies, areas of faster and deeper water, waiting for the bait species to move by.

• **Gear:** The most popular outfit for speckled trout is a 4 1/2- to 5 1/2-foot, medium- to light-action spinning rod that is 6- to 10-pound test. If you prefer soft artificial bait, use lead-headed soft-tailed grubs with red or white heads and green, black, smoke or white tails. For hard bait, Bahen prefers hard plastic MirrOlures. The best natural bait is shrimp — use a 4x treble hook and a float. Have a net handy if you fish from a boat or pier because hooks occasionally pull out of the trout's soft mouth. Remember that treble hooks and nets don't mix.

• **Regulations:** The minimum size for a catch is 12 inches, and the bag limit is 10 fish.



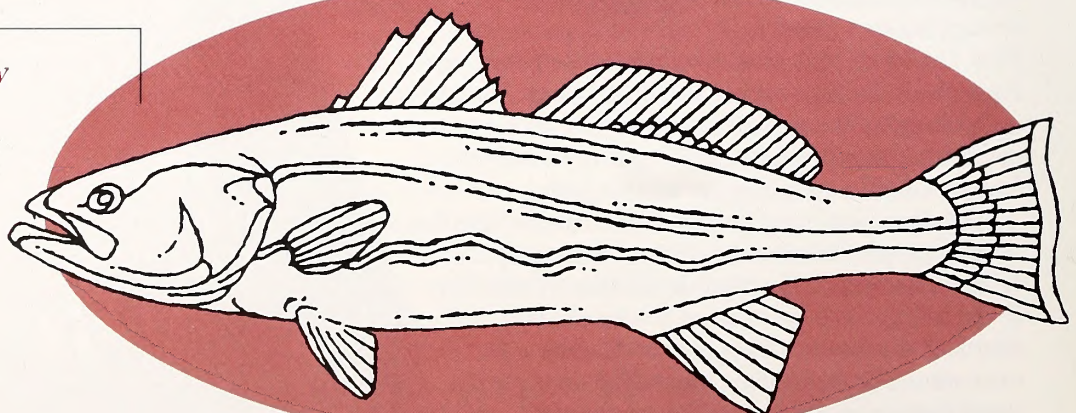
MirrO lure



Grub

## Speckled Trout

- Member of sciaenid family
- Ranges from New York to northern Mexico
- Average catch weight: 1 to 5 pounds
- Average catch length: 12 to 18 inches





## SPOT

Though many consider spot suitable only for the frying pan, it is one of the most popular recreational species along the coast.

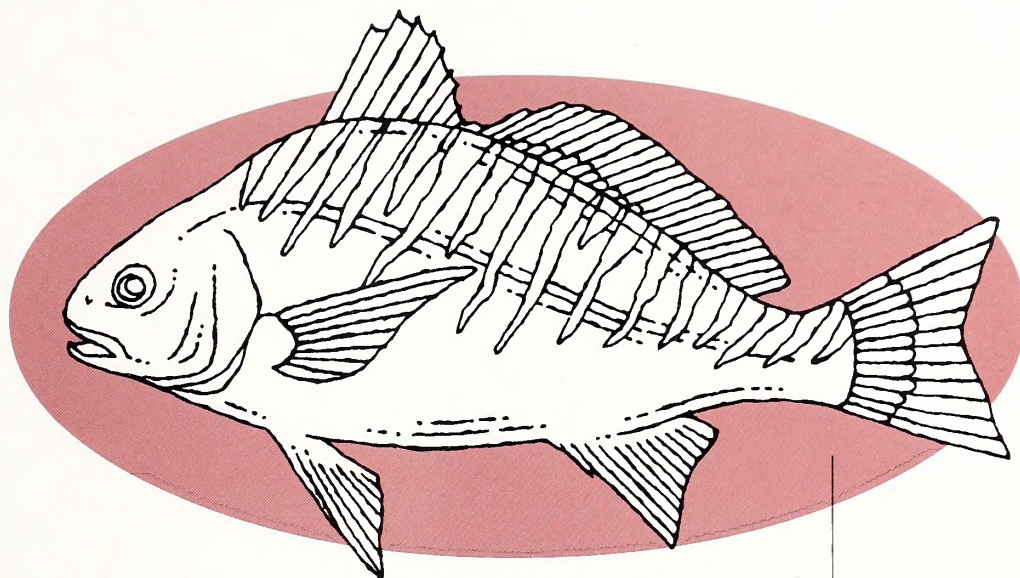
In years past, it was especially sought in the fall by eastern North Carolina farm families weary from harvesting their crops. In September and October, when the fish migrate to the inlets to spawn, hordes of country folk would head to Kure Beach and other choice fishing sites, stash their suitcases in a motel convenient to the water, and sometimes fish straight through the night.

Even though spot can be caught at any time of the day, night is the best time to fish for them because they are more active. On a typical night, anglers can reel in enough spot to fill a cooler.

"The lowly little panfish, the spot, has fed many a hungry mouth in the winter," Bahen says.

One reason is that the fish are not hard to catch. Folks with little angling experience can buy an inexpensive rod and reel, some bloodworms or shrimp for bait — and settle into the rhythm of pulling spot out of the surf, into the boat or onto the pier.

The tide of farmers to the coast at



summer's end has ebbed, but Bahen says some people still keep the tradition alive today. Because spot have no bag limit, fishers can catch their fill. What they don't eat fresh, they can carry back home and freeze for another day when they crave that crispy fried taste of the ocean.

No matter what you angle for, you should plan ahead to handle your catch.

Once the fish is out of the water, chill it right away. Bahen recommends an ice slush made by adding a little salt water to a cooler of ice. ❏

## Spot

- *Member of sciaenid family*
- *Ranges from Delaware Bay to Florida*
- *Average catch weight: 1 to 2 pounds*
- *Average catch length: 6 to 12 inches*

## ANGLING FOR A PRIZE?

Fishers with a competitive spirit may want to take part in one of these tournaments:

- **4th Annual Saltwater Light Tackle Fishing Club Tournament**  
Oct. 31-Nov. 2  
Captain Joe's Bait and Tackle in Atlantic Beach  
919/240-2744
- **Cape Hatteras Angler's Club Surf Fishing Tournament**  
Nov. 5-8  
Cape Hatteras Angler's Club in Buxton  
919/995-4253
- **Friendly City by the Sea 5th Annual Speckled Trout Tournament**  
Nov. 7-8  
Casper's Marina in Swansboro  
919/326-3339

*The North Carolina coast offers myriad fertile fishing spots, and Jim Bahen has fished most of them. If you have questions or tips about where and how to make a good catch, give Bahen a call in Wilmington at 910/256-2083.*



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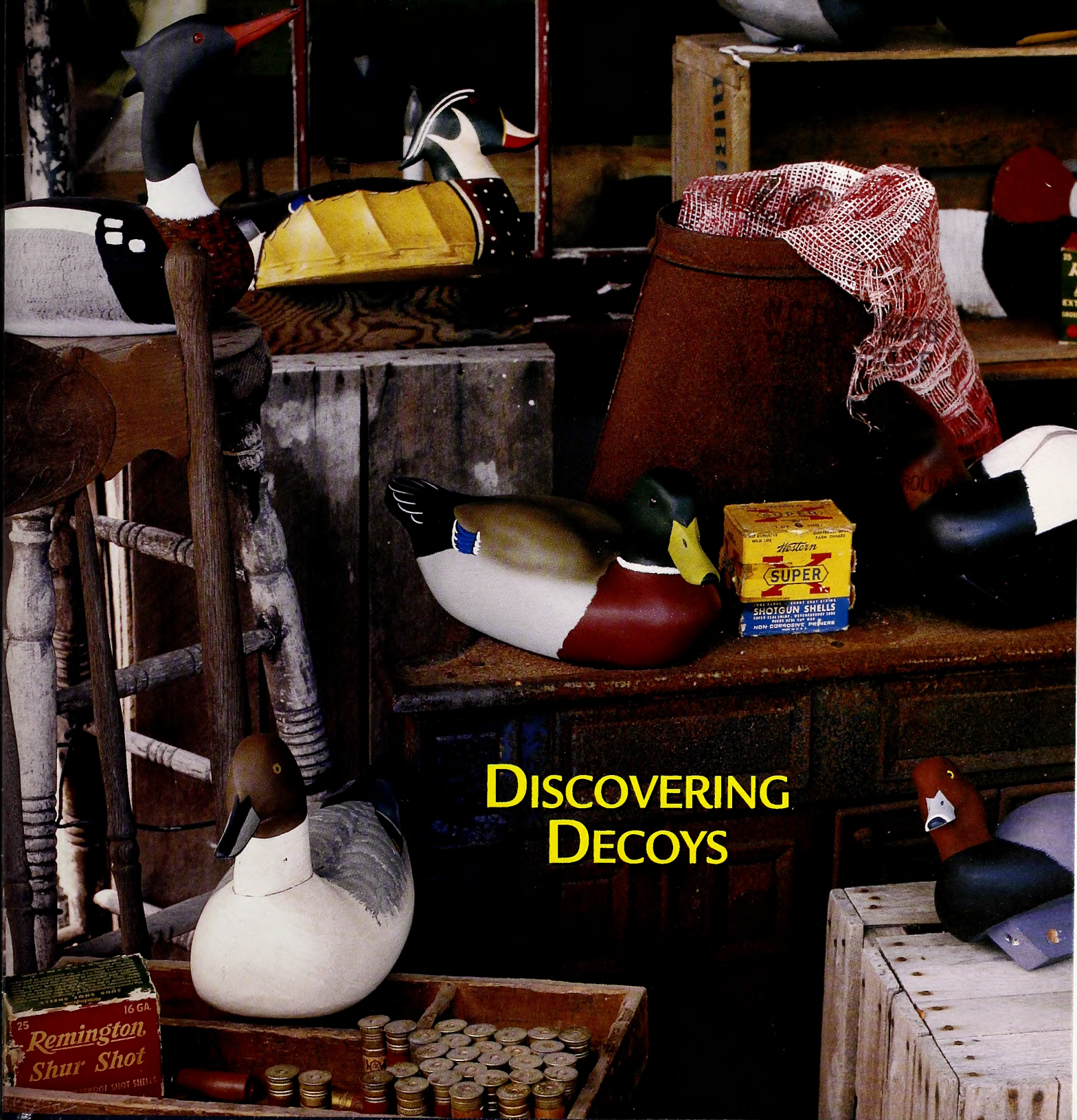
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# Coastwatch

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DISCOVERING  
DECOYS



# *F r o m   t h e   E d i t o r*

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## Winter Tales

It's bigger. It's better. But it's still *Coastwatch*.

With this issue, *Coastwatch* expands by eight pages, offering you more articles on the North Carolina coast at no extra cost.

Clearly, the Tar Heel coast is changing, and its population is growing. With these changes comes the need for more information about issues, people, places and natural resources. To continue in its commitment to cover our coastal region, North Carolina Sea Grant decided to expand its flagship communications vehicle — *Coastwatch*.

Going one step further, we surveyed some of our readers to learn what topics and issues interested you. Your candid responses helped us shape the content and focus of our expanded magazine. We appreciate the help. And we've updated our design, making space for more photographs, illustrations and tidbits of information.

Now it's time to show the results of our efforts. The new *Coastwatch* is unveiled.



Up front in Coastal Tidings, the magazine offers briefs about the marine environment, ongoing research, pertinent publications and resources for further information.

Then settle back and enjoy feature stories that explore complicated issues, acquaint you with coastal people and places, highlight research breakthroughs and return you to simpler times. Staff and free-lance writers take you from

Currituck to Calabash and points in between. I promise it will be a trip worth taking.

Finally, the sections at the back of the magazine are loaded with facts on fishing, seafood, books, nature, science, and people and places. These sections are designed to help readers understand and enjoy our coastal region more fully.

So kick back, put up your feet and catch the latest on the Carolina coast.

*Kathy Hart, Managing Editor*

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---

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# Coastwatch

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# Coastwatch

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The North Carolina Sea Grant College Program is a federal/state program that promotes the wise use of our coastal and marine resources through research, extension and education. It joined the National Sea Grant College Network in 1970 as an institutional program. Six years later, it was designated a Sea Grant College.

Today, North Carolina Sea Grant supports several research projects, a 12-member extension program and a communications staff.

Ron Hodson is interim director.

The program is funded by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration and the state through the University of North Carolina.

*Coastwatch* (ISSN 1068-784X) is published bimonthly, six times a year, for \$15

by the North Carolina Sea Grant College Program,

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Raleigh, North Carolina 27695-8605.

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World Wide Web address:

[http://www2.ncsu.edu/sea\\_grant/seagrant.html](http://www2.ncsu.edu/sea_grant/seagrant.html).

Periodical Postage paid at Raleigh, N.C.

POSTMASTER: Send address changes to *Coastwatch*, North Carolina Sea Grant, Box 8605, North Carolina State University, Raleigh, NC 27695-8605.

*Front cover photo of duck decoys*  
by Scott D. Taylor.

*Table of contents photo of a dolphin*  
by Scott D. Taylor.

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## COASTAL TIDINGS

### Don't Feed the Dolphins

Movies and television shows that depict people swimming with dolphins may do more harm than good for the marine mammals. Well-intentioned folks who want to commune with nature may try to take a watery ride with a dolphin — and put these creatures in harm's way.

Dolphins that beg for handouts from boaters can get too close to turning propellers and sustain serious injuries. Because dolphins are social animals, the begging behavior and dependence on handouts can upset their groups, called pods. The animals may lose the ability to survive, and calves may not learn to find food in the wild. Human food can make dolphins sick, again threatening their chances of survival.

People can also suffer from interactions with dolphins. As with most wild animals, dolphins can be defensive or behave aggressively

when humans approach. They have been known to bite them and even pull them from boats into the water.

Folks who persist in pursuing close encounters with dolphins should know that the Marine Mammal

Protection Act forbids harassing, feeding, hunting, capturing or killing them. Violating this act carries a maximum penalty of \$20,000 and one year in jail.

Observing dolphins from a safe distance, however, is not illegal. The

National Marine Fisheries Service advises boaters to stay at least 50 yards away and let these wild animals live nature's way.

— *Based on information in Protect Dolphins: Admire Them From a Distance, a brochure published by the National Marine Fisheries Service. For more information about dolphins and the Marine Mammal Protection Act, contact the Office of Protected Resources in Silver Spring, Md., at 301/713-2289. □*



### In the Next Issue of *Coastwatch*

#### • *Squeamish about sushi?*

Learn the raw facts about this increasingly popular food.

• *Wilmington's St. John's Art Gallery goes to school* — and uses art to teach children about coastal history and culture.

• *Around Valentine's Day, hearts flutter and skip beats*, but the lovestruck can keep those hearts healthy with low-fat sea fare.



## Salt Marsh Meadows

Cord grasses are the most common grasses along the fringe of North Carolina's salt marshes. They are true members of the grass family that have adapted to the harsh realities of a salty environment.

Cord grasses inhabit the area of marsh above the mud flats that is submerged with salt water only at high tide. Unlike seagrasses, cord grasses do not tolerate total submergence in seawater. Their leaves must always remain exposed to the air.

Salt glands in the cord grass leaves excrete excess salt taken up by the plant. And extensive horizontal rhizomes stretch through the marsh mud, securing sediments and adding to the marsh landscape. ▣

## Wetlands May Help Clean Up Landfills

Most people don't think about their trash once it has left the curbside, but garbage can affect the environment long after it's buried in a landfill. The problem is leachate, a product of decomposing refuse and precipitation that soaks through.

Sea Grant and North Carolina State University researchers are exploring new ways to treat this polluted wastewater with man-made wetlands that mimic natural filtering systems. In 1995, two types of wetlands were planted at the New Hanover County landfill to test their ability to remove nitrogen from the leachate, says Barbara Doll, Sea Grant's water quality specialist. The two-year monitoring effort began in January 1996.

This work is important as North Carolina struggles with the problem of excess nutrients (especially nitrogen) and oxygen-demanding pollution running into its coast-bound rivers from nonpoint source runoff, agriculture, wastewater treatment plants and natural sources such as swamps.

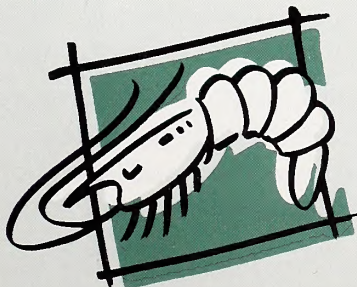
Earlier research has shown that constructed wetlands can effectively remove a series of pollutants known as biological oxygen demand (BOD) and suspended solids from wastewaters. But their ability to remove nitrogen is less certain.

The New Hanover County project is designed to answer some of the unknowns by isolating the different ways that a wetland removes nitrogen — such as plant

microbial uptake, evaporation and microbial processes that break down the nitrogen.

Leachate from the landfill passes through a package treatment plant, which removes pollutants. But during winter months, cooler temperatures inhibit the process that removes ammonia (a form of nitrogen). And because ammonia is toxic to aquatic organisms, it is sometimes difficult for the county to meet state water quality permit limits.

New Hanover County environmental officials hope that constructed wetlands can remedy this problem, Doll says. The study will also help researchers understand how wetlands actually remove pollutants from wastewater. ▣



## North Carolina Sea Grant Revamps Web Page

The redesigned North Carolina Sea Grant web page is up for public view. The new address is [http://www2.ncsu.edu/sea\\_grant/seagrant.html](http://www2.ncsu.edu/sea_grant/seagrant.html). Parts of the site are still under construction, but the program's staff, news and publications pages are operational. ▣





## Stocking Stuffer Idea: *A Guide to North Carolina Seashells*

For many people, seashells are just part of the beach scenery — thousands of pretty but nameless objects strewn along the shore. Other people know the names of shells but often wonder how they were formed and what type of animal lived inside.

Now — just in time for Christmas — there's a guide to identifying shells common to the North Carolina coast. *Seashells of North Carolina*, written by Hugh Porter and Lynn Houser and photographed by Scott Taylor, is a beautiful reference book

for anyone who wants to research their seashore finds.

Once you begin to recognize a few shells, a walk down the beach is never the same. Gradually you learn to use certain marks to solve the puzzle of shell identification.

Experienced shell collectors know a piece of wet driftwood may be full of shipworms or woodboring clams. Shellers carefully search sea fans for tiny simnias. They scan fields of marsh grass for periwinkles. With practice, their sharpened eyes spot

clam holes in the mud and identify tracks left by moon snails. They recognize some new shells from pictures they have seen. Other shells send them scurrying for their guides.

The seashell guide includes photos and descriptions of 261 North Carolina seashells. The cost is \$12. To order, call 919/515-9101 or write North Carolina Sea Grant, Box 8605, NC State University, Raleigh, NC 27695-8605. Ask for UNC-SG-97-03. ■

## Tuna Tips

Bluefin, big-eye and yellowfin tuna are prized commercial and recreational catches that can be hooked just a few miles off the Tar Heel coast. But to retain their quality and market value, these big fish should be handled properly from the time they're taken off the hook.

In the new brochure *Tuna Handling*, Sea Grant Extension Agent Jim Bahen and Lorraine Coffey of the North Carolina State University Seafood Laboratory

describe the best practices for bringing high-quality, fresh tuna to the dock. They explain handling, bleeding, gutting, gilling and chilling procedures. In addition, they describe the various cuts of tuna and discuss the preparation of raw, cooked and canned tuna. Finally, the team provides seafood-safety tips and a tuna salad recipe.

For a free copy of *Tuna Handling*, write North Carolina Sea Grant, Box 8605, NC State University, Raleigh, NC 27695-8605 or call 919/515-9101. ■



## How Old Is that Fish?

You can tell the age of a fish in much the same way that you figure the age of a tree — by counting rings. Growth “rings” on fish are counted either on its scales or on its small inner ear bones, called otoliths. The rings correspond to changes in the seasons, with fish growing a new set of rings each year.

These rings grow faster in summer, when the space between two rings is wider apart, and slower in winter, when the rings are closer together.

— Taken from *Do Dolphins Sleep? Questions and Answers About the Sea*, a publication of MIT Sea Grant, written by Andrea Cohen. □

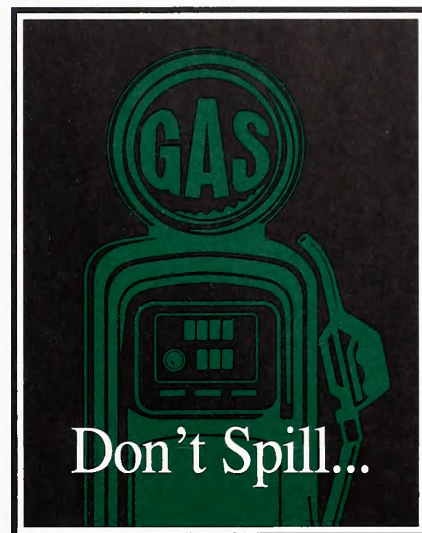
## New Addresses for Sea Grant Field Offices

North Carolina Sea Grant has an extension program on the move. Two of the field offices have recently relocated.

Jim Bahen, marine extension agent; Spencer Rogers, coastal erosion and building specialist; and Shonda Borden, office assistant, can now be reached at the University of North Carolina at Wilmington Center for Marine Research, 7205 Wrightsville Ave., Wilmington, NC 28403. The

phone number is 910/256-2083 (Bahen, ext. 212; Rogers, ext. 264; Borden, ext. 263), and the fax number is 910/256-8856.

Skip Kemp, regional seafood marketing specialist; Bob Hines, marine extension agent; and Vanda Lewis, office assistant, are now at the Commerce Development Center, 3615 Arendell St., Morehead City, NC 28557. The phone number is 919/247-4007, and the fax number is 919/726-4215. □



When boats are being fueled or topped off, up to 8 ounces of fuel can spill into the water. Although some of the chemicals in gas and diesel fuel evaporate rapidly, many toxic compounds remain behind in the water column.

These small spills, multiplied by the number of boats in a busy marina and the number of boating days per year, can create a big water quality problem.

Be careful when fueling your boat at the dock. Don't spill. And if you do, catch any overflow with petroleum-absorbent materials. □

## Coastwatch for the Holidays

This Christmas, give the people on your shopping list a view of the North Carolina coast. It's as simple as subscribing to *Coastwatch*. And never before has the magazine been a better buy. For the holidays, you can purchase one annual subscription for \$15 and get additional subscriptions for \$10. We'll send you gift cards free of charge.

*Coastwatch* gives its readers information they can use in articles that educate, inform and entertain. Look back at what you read about in the pages of *Coastwatch* this year alone: the best canoe trails on the Carolina coast, the pre-Civil War turpentine industry and its effects on the longleaf pine forests, hurricane impacts on buildings and beaches, trends in sea turtle strandings, the

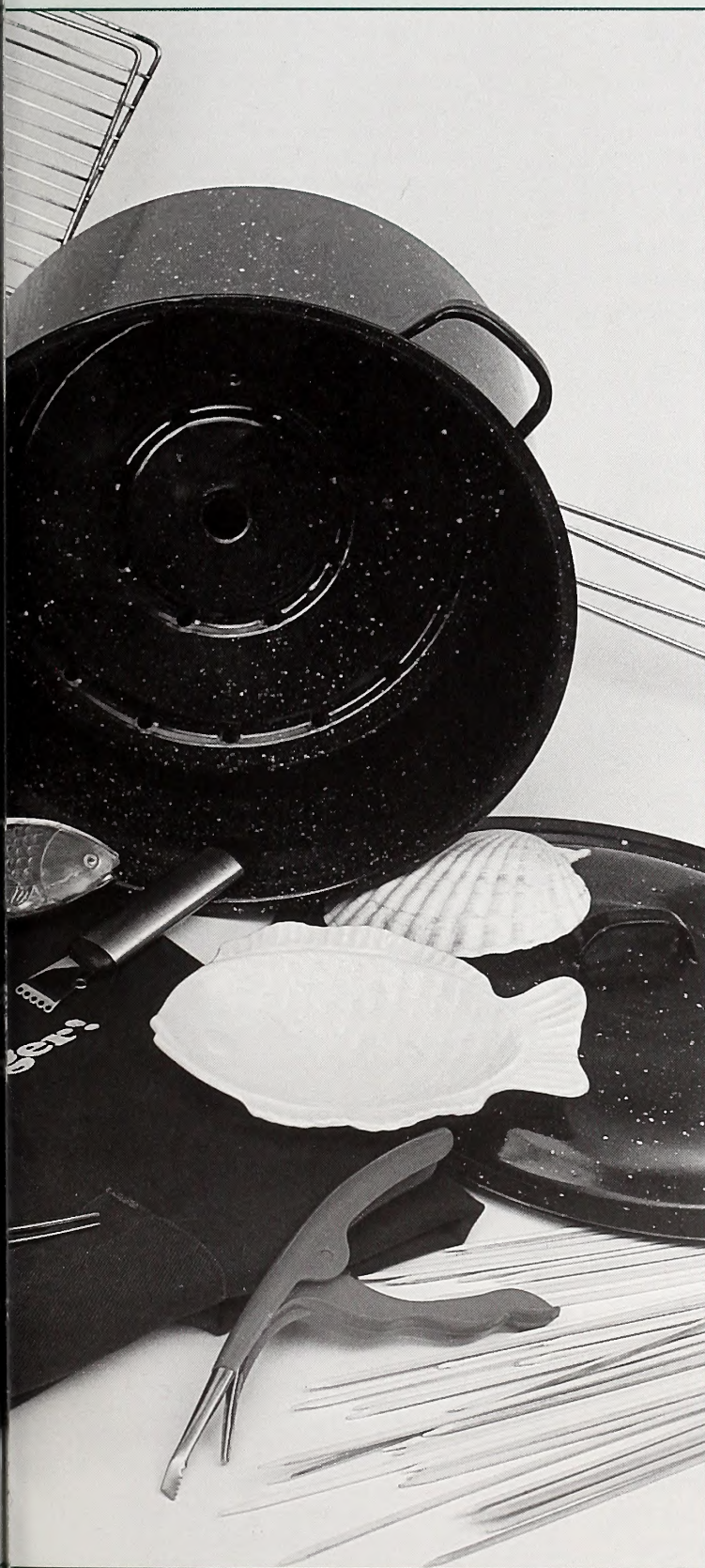
charm of old coastal cemeteries, the pleasure of porches and the adventures of hang gliding. Newly added sections taught you how to catch and cook your favorite seafood.

The magazine is off to a great start for 1998 with more pages and a wider mix of articles. So subscribe now and send your friends and family to the coast. □









# Fishy Gifts for Christmas

*By Kathy Hart • Photographs by Scott D. Taylor*

'Tis the week before Christmas, I'm awake in my bed  
While visions of unfilled boxes dance in my head.  
There's Amanda in Charlotte, John in Manteo  
Who expect gifts of high quality delivered pronto.  
When what to my bleary eyes should appear  
But a list of gift ideas that I could hold dear.  
There's a squeezer, zester, knife and pot —  
Kitchen utensils that don't cost a lot.  
I hop in the car, put my foot to the gas  
I'm off to the store in a holiday blast.  
And you'll hear me exclaim as I drive out of sight  
Merry Christmas to all and to all a good bite.

Christmas is only weeks away, and the anxiety of the rushed holiday season has set in — gifts to buy, stockings to hang and parties to attend. You're wracking your brain for unique gift ideas that will please others without emptying your wallet.

How about kitchen gadgets or cookware, particularly those that make the fisher's catch a little tastier or easier

*Continued*



to prepare? Many of these items are inexpensive, easily found and unique, says Joyce Taylor, North Carolina Sea Grant's retired seafood education agent.

A quick trip to a kitchen, housewares or hardware store or perusal through a catalog, such as Williams Sonoma or Chef's Catalog, can equip you with everything you will need for gift packages or stocking stuffers.

If a gift ensemble is what you want, start by choosing a basket, apron, tablecloth or dish towels with an ocean theme. At housewares stores, you can find fish-shaped baskets, dish towels swimming with flounders, tablecloths adorned with seashells and aprons embellished with lobsters that look so real you'll want to drop them in a pot.

Using one of these items as the base for your collection, add a shrimp deveiner, oyster knife, crab knife, lemon zester, shell cracker, bamboo sticks and/or lemon squeezer. Most of the items cost less than \$8 each. If you want more expensive gift options, consider a grilling basket, high-quality pepper mill, mortar and pestle, large stockpot, fillet knife or poaching pan. These items range from \$15 to more than \$100, depending on quality.

Or why not make smoked salmon or tuna a homemade taste treat for someone on your list? For about \$45, you can buy a home smoker from a discount, hardware or catalog store. If you want to take the work out of the smoking process, you can fork over about \$130 for an electric smoker.

If aesthetics are the point of your purchase, consider a set of shell servers, fish- or shell-shaped napkin rings, nautically embellished napkins, or serving platters and bowls painted or imprinted with fish or shellfish. Several moderately priced (\$50 to \$70) dish sets on the market sport ocean scenes and marine critters. The same goes for glasses (often plastic) and bar sets.

To spice up your holiday giving, present friends and family with a selection of seafood seasoning mixtures, breading mixes, marinades or sauces. You can purchase these items at supermarkets, gourmet food shops and fish markets. Add a cornbread or hush puppy mix, and you have a meal in the making.

To expand your gift recipient's knowledge of seafood, subscribe to *Simply Seafood*, a magazine brimming with good recipes and beautiful photographs. A one-year subscription (four issues) is only \$8.95 (*Simply Seafood*, 5305 Shilshole Ave. NW, Suite 200, Seattle, WA 98107-9950). *Mariner's Menu*, the quarterly seafood-information newsletter published by North Carolina Sea Grant, is an even better deal. It's free. Although it has no colorful photographs of steaming seafood to tempt your tastebuds, it does offer eight to 10 excellent seafood recipes in each issue (*Mariner's Menu*, North Carolina Sea Grant, Box 8605, NC State University, Raleigh, NC 27695-8605).

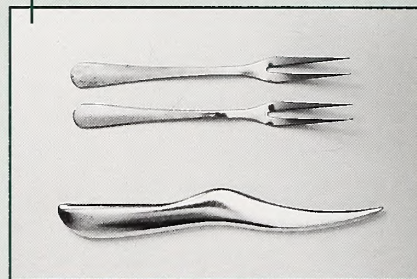
Taylor provides 38 tried, true and tested fish and shellfish recipes in Sea Grant's *No Salt Seafood* cookbook. Instead of using salt to enhance the flavor of the fisher's catch, these recipes call for citrus juices, wine, herbs, spices and other flavorings. At only \$3.50 a copy, this 36-page booklet offers an inexpensive way to complete a gift ensemble or stuff a stocking. (To order, send a check or money order to North Carolina Sea Grant, Box 8605, NC State University, Raleigh, NC 27695-8605.)

Whatever you decide to buy, shop early and remember to keep in mind the tastes (literally) and preferences of the one you're buying for. In any case, keep your receipts for possible returns. After all, at 82, Aunt Zelda may not want to learn how to smoke her own salmon.

Happy shopping! ■

• **Seafood cocktail forks.** (Top) These delicate, dainty forks extract meat from shellfish — blue crabs, stone crabs, snow crabs and lobsters. For a set of four, the price is \$8 or more, depending on the quality. Silver cocktail forks can cost as much as \$35 each.

• **Shrimp deveiner.** (Bottom) This utensil removes the shrimp's shell and waste vein with one motion. The vein runs under the shell along the length of the shrimp's back and holds the crustacean's gritty waste. Insert the deveiner, pointed tip down, in to the vein at the front of the body (shrimp should already be beheaded). Push to remove vein and shell. Cost is \$3 to \$6.



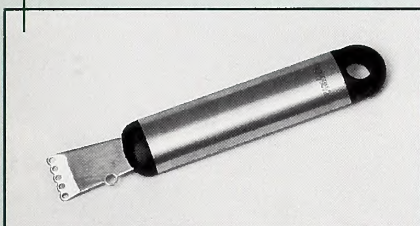
• **Pepper mill.** Almost every recipe developed by Taylor specifies freshly ground black pepper, which has a more intense flavor than the preground, packaged kind. That's why Taylor urges cooks to invest in a well-made pepper mill with a lifetime guarantee. Although these mills can cost more than \$40, their fine-tuned, adjustable grinding mechanism turns out coarse- to fine-ground pepper for years. And toss in a variety of whole peppercorns — white, black, red or green. The mill also grinds spices such as cloves and nutmeg.

• **Seafood cracker.** This plierlike tool cracks crab claws and lobsters. Place the shellfish between the jaws of the cracker and squeeze. Cost is about \$5.

• **Steel-mesh glove.** Gaining entry into an oyster shell, cooked or uncooked, is not always easy, and many an oyster shucker has sliced a hand in the process. To prevent this, purchase a steel-mesh glove that will deflect the knife blade. The pliant, nonskid glove also helps you get a secure grip on sometimes slippery fish for filleting or scaling. These can be purchased through cooking and fishing-tackle catalogs. Cost is \$15 to \$20.



• **Lemon zester.** Lemon goes with seafood like cream with coffee. Lemon-flavored sauces and marinades often specify lemon zest — the outermost colored peel of the citrus fruit. A zester removes this thin peel without incorporating the bitter white pith beneath it. Cost is \$8 to \$12.



• **Lemon squeezer.** Lemon juice and butter are simple but delicious flavor enhancers for many species of fish. Place a lemon half in the jaws of the utensil and squeeze. The juice flows through the holes while the seeds are held back. Cost is about \$5.



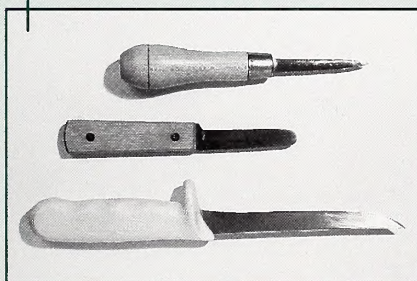
• **Plastic cutting board.** When it comes to fighting bacterial contamination in the kitchen, Taylor recommends a plastic cutting board. Available in various shapes and colors, the boards can be placed into the dishwasher or cleansed with hot water and bleach after use to kill any bacteria associated with raw fish and shellfish. A new type of plastic board claims to inhibit the growth of bacteria with an odorless, colorless, germ-fighting agent named Bacteron™ that is impregnated into the polyethylene boards. Costs range from \$8 to \$25.

• **Basting brush.** A basting brush is a must-have for outdoor grillers if you're going to roast less oily fish such as flounder, grouper or triggerfish. These fish need to be basted with oil, butter or a marinade to keep them from becoming dry while grilling. Cost is \$5 or more.

• **Oyster knife.** (Top) Use this knife to sever the oyster's hinge muscle, which holds the shell tightly closed. For raw or steamed oysters, insert the knife's flat point between the upper and lower shell at the side. Slide the knife to the back to cut the hinge muscle and pop open the oyster. Cost is \$7 to \$12.

• **Crab knife.** (Middle) If you've ever cleaned a freshly steamed blue crab, then you know it has more compartments than a woman's purse. To ease the removal of the sweet, flavored meat from the nooks and crannies of the shell, invest in a crab knife. These are found at coastal bait-and-tackle shops. Cost is \$8 to \$10.

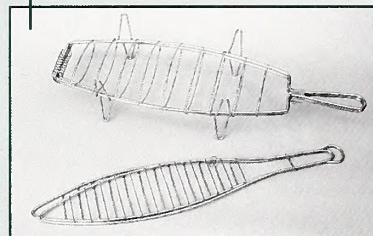
• **Fillet knife.** (Bottom) Good cooks consider their knives the most important tools in their kitchen. For filleting delicate fish, Taylor suggests a 7-inch fillet knife. She recommends investing in the best knife you can afford and a good sharpener to go with it. Costs range from \$8 to \$40.



• **Garlic press.** Like lemon, garlic is often used to flavor seafood sauces, marinades and stews. Invest in a high-quality garlic press that is easy to clean. New to the market, garlic peelers remove the papery covering from garlic cloves with little effort and no lingering smell on your hands. Each costs \$8 to \$16.

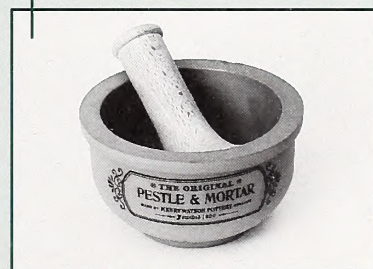


• **Grilling basket.** The grill can be a tough place for seafood. Delicate fillets and small shellfish (shrimp and scallops) can stick to grill slats, fall apart on the grill or drop to the coals below. To prevent these mishaps, purchase a grilling basket that keeps the seafood on top of the grill and permits easy turning when it's time to cook the other side. You can find these at housewares, hardware and discount stores for \$8 or more.



• **Skewers.** Skewers, metal or bamboo, offer another alternative for holding your seafood together on the grill. Shrimp and scallops and chunks of less delicate fish — mackerel, tuna, swordfish and mahi-mahi — are easy to skewer. If you choose bamboo skewers, soak them for a half-hour before grilling. Otherwise, they'll burn. Costs range from \$1 to \$5.

• **Mortar and pestle.** This age-old combination is used to crush herbs, spices and garlic to make them finer and to release more flavor. Cost is about \$20.

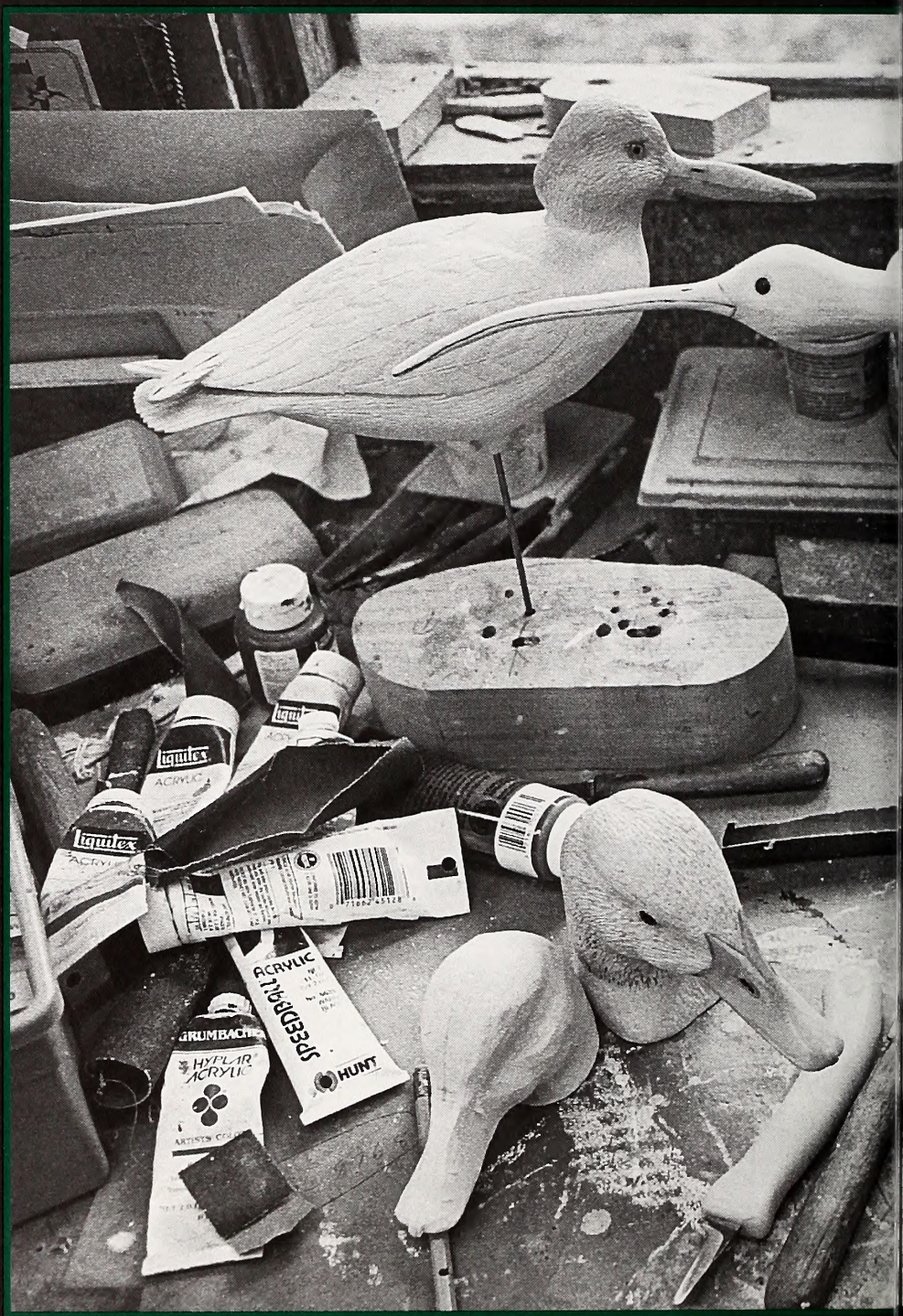


• **Stainless steel or enamel stockpot.** A stockpot (8-, 12- or 16-quart) is ideal for seafood chowders, stews and gumbos. Add a fitted steamer or pasta insert and you can steam oysters, clams, mussels, blue crabs, shrimp or lobsters. A good stockpot is a must-have for any seafood cook. Costs range from \$12 to more than \$50. □

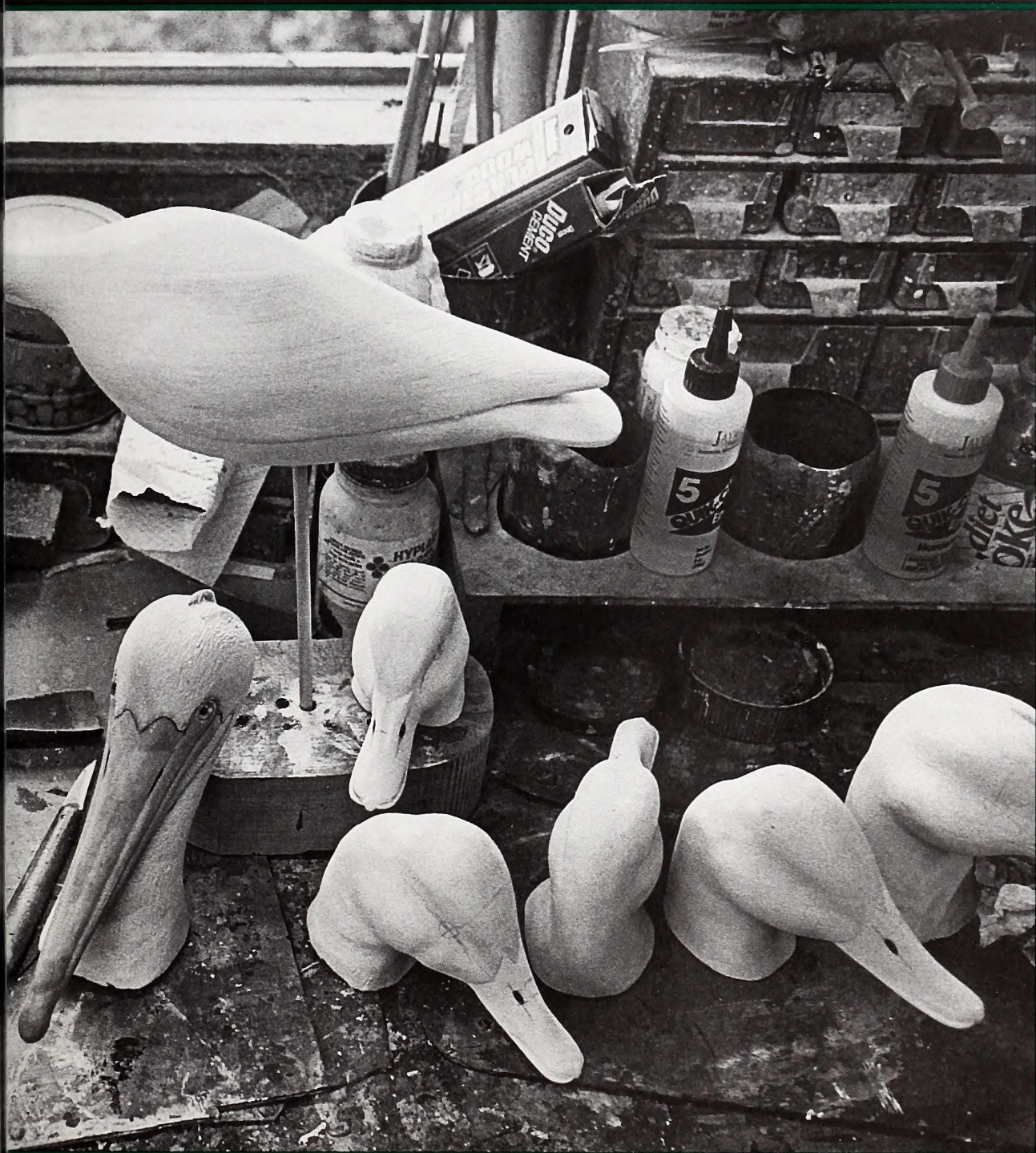


# Discovering Decoys

*By Julie Ann Powers • Photographs by Scott D. Taylor*







*These handcrafted treasures draw admirers and premium prices.*



A lot of Harkers Island history is carved out of wood and shaped like a duck. So, it might seem, is some of the future.

But the wooden waterfowl these days are far more likely to decorate a mantel than bob atop a saltwater wave. The decoys that once coaxed game birds such as canvasbacks and bluebills into shotgun range are now attracting flocks of tourists and collectors.



Carving decoys is a Down East tradition turned evolving art form and emerging cottage industry. Like quilts and other folk arts, the handcrafted creatures that draw admiring crowds and premium prices today were an ordinary item of daily life a generation ago.

They were tools for securing food. Ducks and geese were a source of protein, a tasty one. Hewing decoys out of a log was a natural part of a culture where people depended on nature, and themselves, for their needs.

"This part of the country was poor country," says lifelong resident Curt Salter, 69, as he smooths a handful of

tupelo into a sharp-billed loon head. "You couldn't afford to buy everything."

Although money might have been scarce, waterfowl were not. Core Sound and the surrounding waters and marshes that provided the area's fishing livelihood also beckoned to hundreds of thousands of ducks and geese, swans and loons each fall.

"They'd look like an island out in the sound, there were so many," says Salter. So abundant were the birds early in the century that market hunters filled boxcars with game birds bound for city restaurants and butcher shops.

Hunters crafted their own "rig" of

decoys to bring the bounty nearer their boats. For puddle ducks such as pintails or teals, a dozen decoys might do. Canvasbacks, redheads and the like that preferred open water would be fooled only by a "raft" of 100 or more wooden relatives. Some decoys always got lost in the marsh or carried off when hurricanes washed away the nethouses where they were stored, making carving an annual task.

"That was part of hunting," Salter says. "Not just going out and shooting. Getting your blind and your boat and your gun ready, that was part of it."

Carvers used cedar, cypress or whatever wood was at hand, but they





*Curt Salter works in his shop.*

avored water-resistant juniper. A quartered log yielded blocks for four bodies. For economy's sake, the heads were whittled separately – a whole duck required a much bigger block of wood. And decoys were subject to decapitation as hunters sometimes kicked the wooden waterfowl as they moved about their small boats. Replacement heads were sold by the bucket.

The decoys of the old days were simple, intended only to fool a flock flying far overhead.

"They didn't have to be fancy to do the work," Salter says.

The carver chopped the shape out

with a hatchet, contoured it with a pocketknife and a rasp, and smoothed the surface with broken glass in earlier years, sandpaper in later ones. A head was nailed on, the bird was painted with the basic markings of its species and a weight was attached to the bottom to keep it "swimming" upright.

Many of today's craftsmen, working largely for the home-decor market, are better described as wildlife carvers than decoy makers. Sophisticated texturing and painting techniques have brought a new level of realism. Soft tupelo is now the preferred medium, and carvers have an array of tools – many similar to surgical instruments – to sculpt such minute details as the spines and individual hairs of each feather. Salter has won carving contests for his exquisite bird-head carvings. He etches even the underside of a duck bill with all the tiny lines and indentations found on the real bird.

Modern-day prices reflect the skill and time involved. Depending on the size of the bird and the amount of detailing, Salter's work sells for \$75 to \$300 a bird. Other area carvers ask from \$30 to more than \$3,000.

Carvers say the evolution to finer artistry was inspired by their own interest and that of collectors.

"It just seemed natural to make them prettier," says Carl Huff of Harkers Island, known for his way with color and texture. His green-winged teal hen looks as if she could quack. It comes almost as a surprise that her feathers, shingled into the wood by hundreds of blade strokes and tinged dozens of subtle shades of brown, are not soft to the touch. The hen is priced at \$3,000.

Huff, 61, grew up in Henderson and hunted in another waterfowl-rich area, Currituck County. His first carvings were working decoys. Eventually he found he was more interested in creating the wooden critters than in shooting their live counterparts.

"I got tired of killing, but I loved carving," he says.

Like many carvers, Huff crafts shorebirds and songbirds as well as game

birds. His work includes intricate tableaus, such as hummingbirds suspended from azalea blossoms and a green heron poised in a leaf-lined pond.

But there remains plenty of interest in the "gunning" decoys that Roy H. Willis creates in his Stacy workshop, much as his late father did for 60 years. His essential tools: a small hatchet, a chopping block and an X-acto knife.

"I don't do much detail," he says. "I make them just like I always made them to hunt with." Still, the smooth contours and fundamental color patterns combine for a striking scaup or redhead. Roy's only concession to the decorative trend is the eyes he puts on his birds. Old-time decoys were made without this feature because a flock in flight wouldn't notice.

Roy, 64, made his first decoy in 1955 out of a cypress rail torn down from the Harkers Island bridge. A truckload of discarded rails were transformed into decoys at the hands of his father, Eldon Willis, and Elmer Salter.

Well-known partners Down East, the two started carving together as young men in the 1920s. Their first birds were for their own rig; then came an order from visiting hunters. What followed was 40 years of carving and friendship. When Salter died in 1964, Roy took up working at his father's side.

"He'd chop them out, and I'd finish them up, sand and paint them," he says.

They turned out at least 200 full-sized decoys a year, he estimates, and that many again in miniatures, working part-time. The elder Willis was a commercial fisher and a shingle maker. Roy worked at the Cherry Point Marine Corps Air Station in Havelock after he left the Coast Guard.

When Roy began carving with his father in the mid-1960s, manufactured decoys were replacing handmade ones. Their craft had become something of an anachronism.

"It was a lost art back in the '50s and '60s," Roy says. The two charged \$1.25 for a duck decoy when he started working with his father.

*Continued*



"They weren't valuable," he says. "Some people didn't chase them down if they drifted away." Collector interest dawned in the 1970s, and now, some vintage decoys can fetch hundreds of dollars.

Roy's new birds begin at about \$40. After his father died in 1981, Willis modified the basic body shape the two had used to distinguish the birds they worked on together from his own.

"Everybody's got their own style," he says. He pulls a tubby bufflehead and a merganser drake with its distinctive crest from a crowded shelf in his cluttered workshop.

"There's nothing similar about those two," he says. "But if you get to looking at them, you can tell I made them both."

His workshop is typical of carvers: fragrant with wood scent and sprinkled

with sawdust. Clusters of heads and heaps of bodies in various stages of refinement cover the workbench and floor space. Decoys strung together like dried onions hang from wall hooks. Overhead shelves are crammed with finished birds. Prize ribbons flutter from some necks, price tags from others.

Few of those for sale will ever end up on the water – unless Roy takes them himself. He still loves to hunt, and some collectors like a bird better if it has been out on the marsh for a season.

Some carvers, too, say they have noticed a new interest in decoys used as a centerpiece of a hunting trip. Bernie and Gail Corwin had a dozen calls for working decoys last year. The husband and wife make decoys and sell their work and that of others at their shop, Lucky Duck's in Bettie.

The Corwins say some hunters don't mind paying for a handsome, handmade decoy they can keep as a desktop souvenir and conversation piece. The bulk of their business, however, is decorative decoys for people interested in nature or heritage, rather than hunting.

"They just like the birds," Gail says of her customers. "They like the carving for the tradition. It's not from Wal-Mart. Everybody does it differently, and you're getting a part of that person with each decoy."

Bernie came to carving the way many of his neighbors did. He hunted and carved growing up on Long Island.

"I come from a long line of market hunters," he says. "My mom always said I was a throwback." He later worked as a hunting guide on the Outer



*The heads and bodies of decoys are carved separately.*



## Core Sound Waterfowl Museum

It will be called the Core Sound Waterfowl Museum, and it will, of course, feature the trademark decoys carved by local legends. But its backers say the facility will go beyond that.

"This is not a decoy museum. It's a people museum," says Carl Huff, a carver, Carteret County commissioner and member of the museum board of directors. "It's about the heritage and history of eastern North Carolina. It's about people and personalities and history, and decoys are part of that."

The museum is an outgrowth of the Core Sound Decoy Carvers

Guild, which began about 10 years ago. A group of local carvers came together then to ponder how to perpetuate their craft and preserve the work left behind by old-time carvers.

"A lot of the older decoy makers were leaving us," Huff says. "We realized some of this heritage and artwork needed to be preserved." When the local doctor's office closed, the community lessened the loss by turning the old clinic on Harkers Island's main road into temporary museum quarters.

The new 20,000-square-foot museum is slated for 16 acres at Shell Point, near the tip of the island. The land is adjacent to the National Park

Service's Cape Lookout National Seashore headquarters and is leased from the service under long-term arrangements. In addition to the building, the complex will feature nature trails and wildlife and waterfowl observation stations overlooking ponds and wetlands. Construction began this year.

Fund-raising is still in progress to amass the more than \$2 million needed to complete the building and grounds. Funds come from memberships, donations, sales at the museum gift shop and the annual Core Sound Decoy Festival in December. ■

## Festival Details

The 1997 Core Sound Decoy Festival runs Dec. 6-7 at the Core Sound Waterfowl Museum, 1205 Island Road on Harkers Island, and the neighboring elementary school. The festival features decoy carving and painting contests; demonstrations, displays and sales of new and old decoys; and other activities related to carving, hunting and waterfowl. Admission is \$5. For more information, call 919/728-1500 or point your browser to <http://www.coresound.com>. ■

Banks, making decoys for the hunts. He continued to make the birds in his spare time for his former employer after he went into the construction business at Harkers Island.

Gail, a Raleigh native, had neither hunted nor carved when she first picked up a block of wood under her husband's tutelage. The career change came when her pregnancy with Caroline, now 13, put an end to her participation in construction work. Gail claims she had no previous inkling of artistic talent.

"It was something I just took to," she says. The Corwins eventually turned the part-time enterprise into full-time and opened the store. Their birds range in price from \$30 to \$100.

Bernie cuts and shapes the birds at a workshop. Gail paints them while she minds the store. Their birds are "decorative slicks," meaning the wood is not textured. The intricate feather patterns

come from Gail's brush on the smooth surface. The Corwins co-sign each piece and turn out perhaps 3,000 birds a year.

"Some people do it as a hobby," Gail says. "We do it for work. That's not to say we don't enjoy it. We wouldn't want to do anything else."

Bernie, 41, and Gail, 39, are two decades younger than many of their counterparts and represent something of a new generation of carvers. Their daughter, Caroline, is perhaps the next.

Carving since she was tiny, Caroline has won almost every junior carving competition she's entered. She loves to hunt, and last Halloween, the pretty teen-ager with long blond curls costumed herself as a duck blind. She is saving the money she makes from her decoys for a hunting dog.

A youngster with a handful of wood is a wonderful sight to the older carvers. Worried their art was fading

and old decoys were lost and destroyed, seven of them gathered 10 years ago to form the Core Sound Decoy Carvers Guild. Membership now stands at 300, and the movement has inspired a campaign for a grand museum to tell the story of decoys, decoy carving, waterfowl and hunting in Down East heritage.

Meanwhile, carvers come together on the wide front porch of the museum's temporary quarters. Sitting in rocking chairs, using fish boxes for tables, they exchange tips and stories as they whittle and sand and rasp wood into decoys, and chat with visitors who drop by to watch.

"There's no secrets," Salter says, after he explains to a novice how to sand a groove on a sandpiper's head for a more realistic eye. "Anybody that comes along and wants to know, we'll show them how to do it. We're trying to pass this on." ■



# TOURS OF HISTORIC HOMES

## Remember Christmases Past

By Odile Fredericks

In the 18th century, Christmas was a time of socials and merriment among landowners in coastal North Carolina. The doors of homes were thrown open to welcome revelers, and the air filled with laughter as people shunned work for pleasure.

Christmas then was a season not only of religious observance, but also of celebrations oriented around food and dancing, a season of joy often sealed with marriage vows, says Linda Jordan Eure, manager of Historic Edenton, a state historic site.

"We think today of June brides, but in the 18th century, a lot of people married in that holiday season following Christmas because it was a time when people were more socially oriented," she says.

Both George Washington and Thomas Jefferson were married around the Christmas season, a time when plantation owners and farmers finally could relax and the first frost had hardened the ground enough for travel, says Mary Ann Coffey, a columnist for the *Chowan Herald* and an Edenton tour guide.

"The crops had been brought in, the work in the fields was over and people were facing winter," she says. "They did use this as an occasion to visit, entertain. It was a celebration over several weeks rather than focusing on Christmas Day. And it was a socializing sort of holiday, rather than an exchanging of presents."

Today, from Edenton to Beaufort to Wilmington, the tradition of Southern hospitality continues at Christmas. And those who want to get a glimpse or taste of Christmases past need only step into the historic homes of coastal towns, where traditions that washed ashore

many centuries ago live on.

"When you walk in these old houses and you think of the people who have continued to make a home here and all the generations that have used these houses, that time kind of just disappears," Coffey says.

In Edenton, the Wessington villa on West King Street is home to Anne Rowe and her mother, Dorothy Graham. Their ancestors have lived in the

has enjoyed hosting the tours over the years.

"I open my house a lot and have for a number of years," she says. "It's a big house, and I feel very strongly that it should be shared. And I've met a lot of interesting people because I have opened it that I wouldn't have otherwise, and that's made it very special."

Wessington is just one of the private homes and historic sites in Edenton open



Courtesy of  
the Beaufort  
Historical  
Association

two-story Italianate house since 1886; the house dates to 1850.

As a child, Rowe remembers that parties, two and three a week, began the first of December in the town. She has fond memories of biscuits rising on her grandmother's woodstove in preparation for family feasts. She recalls her father telling her of the Christmas tree adorned with little white candles and homemade decorations his mother placed in the front parlor.

"They wouldn't allow it to be seen till Christmas Eve, then it would be lit and that would begin the Christmas festivities," says Rowe, adding that she

to the public during the Christmas Candlelight tour Dec. 12-13. All feature period decorations — branches of pine, magnolia or other greenery found nearby — and some offer refreshments based on centuries-old recipes.

Following are other houses open during the season:

• **Cupola House**, South Broad Street. The 2 1/2-story frame house, built in 1758 by land agent Francis Corbin, features a massive cupola and lavishly carved decoration. Visitors to the open house can savor a cup of wassail, an English drink dating from the 1700s. "Wassail" is believed to



come from the Saxon phrase *waes hael*, meaning “to your health.”

“Wassail is a beverage that has deep roots in the Christmas holiday season,” Eure says. Both the spiked and mild versions of the drink, which tastes like hot spiced apple cider, are served.

- **Iredell House**, East Church Street. Built between 1756 and 1769, it was the home of James Iredell, attorney general of North Carolina at age 28 and associate justice of the U.S. Supreme Court at 39. The main part of the house was built after Iredell’s death in 1799, and the building now is a museum of the 1775-1825 period. The holiday celebration features a “groaning board” of desserts — a table so

event is remembered as the earliest known purely political activity by women in the American colonies — they supported the North Carolina provincial deputies’ resolve not to drink tea or wear British cloth.

- **Beverly Hall**, West King Street. John Bonner Blount built the house about 1810 and from it ran his private bank, which became a branch of the State Bank of North Carolina. The State Bank bought the house in 1816, but when the branch closed in 1835, the house reverted to private hands.

- **West Custom House**, Blount Street. Wilson Blount, a merchant, built this house with its double-decker porches around the beginning of the American Revolution.

Beaufort stages its annual Christmas celebration by opening its historic site. Several bed-and-breakfast inns around town also have open houses.

Nan O’Pray of the Beaufort Historical Association says all of the buildings at the historic site, 138 Turner St., will be open with the exception of the 1796 county courthouse, which is undergoing renovations. They include the Joseph Bell and Josiah Bell houses, which date from 1767 and 1825, respectively; an apothecary shop; a schoolmaster’s cottage; the Leffers cottage, built in 1778; and the old Carteret County jail.

Docents in period dress roam the historic site to provide information to visitors. O’Pray and Peggy Langdale of the historical association say the



Courtesy of the  
Beaufort Historical  
Association

Courtesy of the  
Lower Cape Fear  
Historical Society



heavily laden with food that the boards groan from the weight.

- **Barker House**, South Broad Street. The house probably was built in 1782 for Thomas and Penelope Barker. Thomas Barker had a long career in colonial government, becoming a London agent for the colony shortly before the American Revolution. The house is now headquarters for the Historical Commission.

A holiday tea is served during the open house. According to legend, Penelope Barker presided over the Edenton Tea Party. The Oct. 25, 1774,

In Beaufort to the south of Edenton, the holiday season kicks off on Dec. 6 with an event celebrating the maritime tradition of a town that’s been haven to pirates and seafaring merchants alike: a parade of ships.

Several dozen boats docked in the area ply the waters of Taylors Creek at dusk, hailing those on shore with song and Christmas lights. Local innkeeper Joe Johnson says the event recalls bygone days when ships in port were lit with candles in celebration of the holiday.

The following week, on Dec. 13,

site is decorated simply, much as it was two centuries ago, with green garlands and wreaths full of oyster shells and fruit.

During colonial times, residents of Beaufort would pull branches off berry bushes from the coastal swamps and twist them into wreaths, Langdale says. They then would bleach oyster shells and place them in the wreaths along with fresh fruits such as lemons or apples.

Six bed-and-breakfast inns dating from colonial and Victorian eras are open within a few blocks of the

*Continued*



historic site. Decked in period decorations and serving a variety of refreshments, they are:

• **Pecan Tree Inn**, 116 Queen St. Constructed in the 1860s, the house was named for the 200-year-old pecan trees on the property. It was home to Beaufort's first electric lights, telephone and indoor toilet, and it has served as a Masonic lodge, school-house, doctor's office and tearoom, according to co-owner Joe Johnson. The open house features a tree decorated with more than 400 Santa Claus figures and a local wood carver creating even more versions of St. Nick, Johnson says.

• **Captain's Quarters**, 315 Ann St. The Victorian house dates to the turn of this century and was built by

• **Cousins Bed & Breakfast**, 303 Turner St. The house formally dates to 1855, although innkeeper Martha Barnes said parts were built by local merchant Gabriel Benjamin as early as 1840.

• **Delamar Inn**, 217 Turner St. Jacob Gible, a local merchant who owned a dry goods shop and lumberyard, built the house for his family in 1865. Over the years, the Gible family intermarried with the Delamars, who kept the house in their family until about 20 years ago, says co-owner Mabel Steepy. The open house resonates with music from the Scottish Highlands, and visitors can sample shortbread and wassail and stroll through the English-style courtyard garden.

through some of the city's private historic homes.

Nine miles north of the city that same weekend, Poplar Grove Plantation, built in 1850 for Joseph Mumford Foy, hosts a Victorian Christmas open house and Civil War encampment on the grounds. Descendants of the Foy family and Mr. and Mrs. Santa Claus dress in Victorian garb and mingle with visitors. There are also displays of traditional crafts such as loom weaving.

Ticket holders to the Old Wilmington by Candlelight tour are treated to Christmas music in most of the houses and on street corners and a horse-drawn carriage ride, which begins at the historic Bellamy mansion.

Built between 1859 and 1861 for wealthy physician and plantation owner



*Courtesy of the  
Lower Cape Fear  
Historical Society*

*Courtesy of the  
Beaufort Historical  
Association*

*Far right: Courtesy  
of the Delamar Inn*



the great-grandson of one of the original whalers to call Beaufort his home port, says co-owner Dick Collins. It also has been used as a tonsillectomy hospital and a Sunday school.

• **The Cedars**, 305 Front St. The inn consists of two houses, one built around 1768 by shipbuilder William Borden Jr. and the other in 1852 by his great-grandson, owner Linda Dark says. Borden was a prominent politician and the largest landowner in Carteret County, possessing tracts that stretched as far as Emerald Isle, which in colonial days was known as Borden's Banks.

• **Langdon House**, 135 Craven St. Originally built in 1733, the house was added to in the 1790s, 1870s and early 1900s and features a combination of colonial and federal styles, according to owner Jim Prest. For the holiday celebration, Prest serves refreshments based on colonial recipes, which in years past have included gingerbread made 1740s-style and a meadlike drink to wash it down.

In Wilmington, an 18th-century center for trade, politics and culture, the Old Wilmington by Candlelight tour Dec. 6-7 offers a melodic trip

John D. Bellamy, the four-story, 22-room mansion was occupied for a time by Union forces during the Civil War. It remained the family home until 1946 and is now a history and design arts museum.

Festooned in garlands of natural greenery, decorated with fruit, lace and live plants, the mansion is dressed for an antebellum Christmas, says Marcella Rippel, visitors services coordinator with the mansion's museum. It does not have a Christmas tree because that German tradition did not become popular until Victorian times, she says.

From the mansion, where the



Wilmington Concert Band performs, visitors move to private houses, where local pianists play and enthusiastic owners like Carolyn Smith Caldwell wait to share tales from the past. Caldwell, whose 1895 house is decked out for a Scottish Christmas to celebrate her own ancestry, says she stays in touch with one of its early inhabitants. Now in her 90s, this woman shares with Caldwell her early memories of the house and how children liked to slide down the banister of the 22-foot-long staircase.

Here's a look at some of the other homes on the candlelight tour:

- **Sampson-Johnson House**, 602 Walnut St. Dating from the mid-1800s, this Greek revival-style house was built and owned by James D. Sampson,



the son and slave of a rich planter in Sampson County. In 1819, his father is said to have taken 18-year-old Sampson to Wilmington, freed him and set him up as a carpenter on the lot where the house now sits.

Sampson trained slaves as free apprentices in carpentry. In 1872, the property passed into the hands of Fannie A. Johnson, the wife of a turpentine distiller, and about 70 years later to Daniel Carter Roane, a black physician, who used the house as his office.

- **William Holladay House**, 117 S. 4th St. George Williams built this

Queen Anne-style house in 1889 for his daughter, Maggie, who died before it was completed. Her husband, William W. Holladay, designed the interiors. According to legend, the ghost of Maggie still wanders the house, looking in on children in the bedrooms.

- **Woolvin-Warren House**, 512 Chestnut St. The Queen Anne-style residence was built in 1895 by James F. Woolvin, apparently for his bride, who died soon after it was completed. It was later sold to Archie Warren, an ice-cream and candy maker whose family lived there until 1980.

- **Jenkins Row House**, 228 McRae St. This home is one of nine row houses built in 1914 by local businessman Carl Polvogt, who rented them to railroad workers. They are the only row houses left in Wilmington, says owner Bob Jenkins.

- **Yopp-Goodman House**, 215 N. 6th St. Built about 1850 for William John Yopp, a railroad freight agent, the house is described as a mixture of Italianate and Queen Anne styles. In 1888, it was bought by William and Bernhardt Goodman, brothers who lived there for 84 years.

- **Baldwin House**, 3 S. 4th St. This Queen Anne-style house was built in 1895 for Dr. A.M. Baldwin.

- **Northrup-Carr House**, 213 S. 2nd St. A simple design of the federal period, the house was built in 1829 for Isaac Northrup, a merchant.

- **McEachern House**, 214 N. 6th St. The house was built in 1904 for Neill M. McEachern, a commodities distributor, in the neoclassical revival style.

As they wander the candlelit pathways to historic houses, visitors gain an appreciation for Wilmington's history and its people, past and present, says Cathy Myerow, executive director of the Lower Cape Fear Historical Society.

"You walk away with a good holiday feeling," she says. "It's just a wonderful way to start the holiday season." ■

## EDENTON

- The Christmas Candlelight Tour of modern and historic homes is offered from 4 to 8 p.m., Friday, Dec. 12, and Saturday, Dec. 13. Tickets are \$15 and include tours through the Cupola, Iredell and Barker houses from 1 to 5 p.m. both days. For tickets, contact: the Edenton Historical Commission at 919/482-7800 or drop by its office at the Barker House (tickets will be sold there the day of the tour), the Historic Edenton Visitor's Center at 919/482-2637, or the Chowan Arts Council at 919/482-8005.

## BEAUFORT

- Free open houses at the Beaufort Historic Site and bed-and-breakfast inns run 2 to 4:30 p.m. Saturday, Dec. 13. Anyone who would rather not walk to the inns can opt for \$3 rides aboard a double-decker bus. For information, call the Beaufort Historical Association, 100 Block Turner Street, 919/728-5225 or 800/575-7483.

## WILMINGTON

- The Old Wilmington by Candlelight tour runs 4 to 8 p.m., Saturday, Dec. 6, and Sunday, Dec. 7. Order advance tickets by calling the Lower Cape Fear Historical Society, 126 South Third St., at 910/762-0492 or 910/763-5869.

- Poplar Grove Plantation, 10200 U.S. 17 North, hosts its free Christmas Open House, 10 a.m. to 5 p.m. Saturday, Dec. 6, and 12 to 5 p.m. Sunday, Dec. 7. For information, call 910/686-9989. ■



A HISTORIAN'S  
COAST

# Small Miracles

*By David Cecelski*



Photograph courtesy of the UNC-CH Library N.C. Collection



A small miracle happened to me last summer. As I kayaked at The Strait, just south of Brown's Island, six or seven bottle-nosed dolphins suddenly surfaced. They swam so close to my boat that I could have touched them with my paddle. I had watched dolphins from afar all my life, but I was still startled by their size up close, their beauty and the stallionlike snorts they make as they clear their blowholes. They stayed at arm's length for a half-hour rolling alongside me and diving under my boat. If I slowed down, they waited. If I sped up, they did too. In all my years of boating on coastal waters, I had never experienced anything like it.

In the holiday spirit of counting one's blessings, I have been thinking about such small miracles. Too often, I take them for granted. As a historian, for instance, I tend to view our coastal history as a rather grisly tale of environmental abuses. I forget all we have to be thankful for. Much of our native habitat has been lost, and far too many wildlife species are endangered. But beautiful places and wild things worth fighting for still abound: Seashores, swamps and forests have miraculously survived centuries of settlement, exploitation and development. It's a miracle we have them — and that we have a chance to save them for future generations.

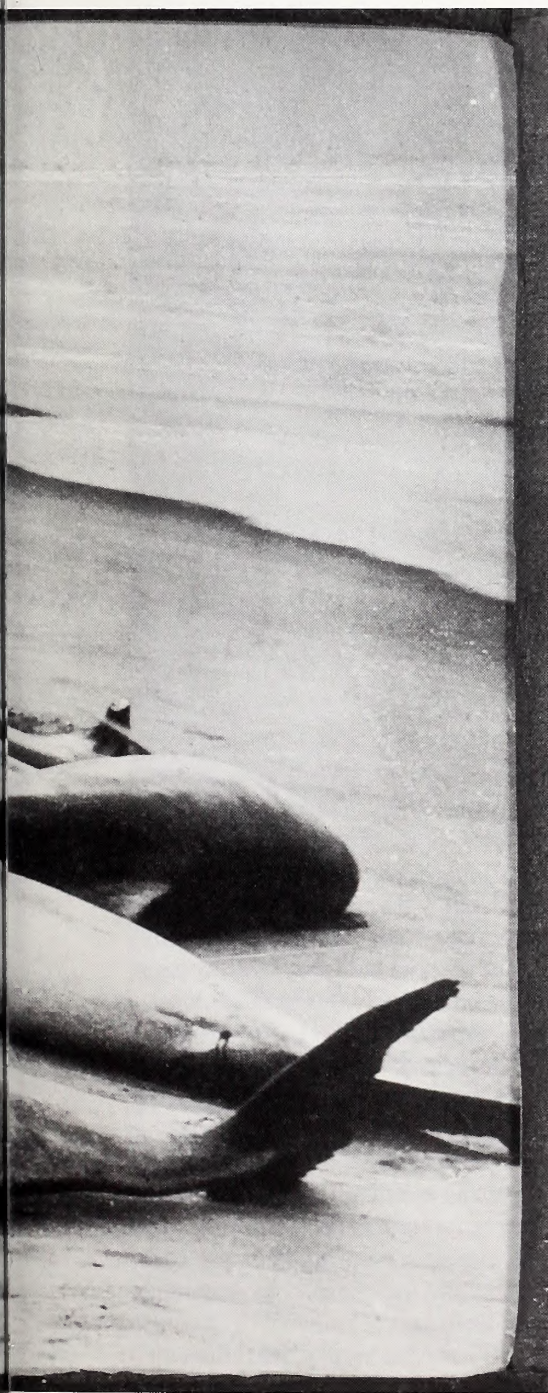
The survival of bottle-nosed dolphins is one of those small miracles. Until the 1920s, most coastal residents considered dolphins — or “porpoises” as old-timers still call them — an exploitable resource at best and pests at worst. For more than a century, in fact, they were hunted for their oil and skin. They could easily

have been exterminated if conservationists had not convinced our political leaders to protect them by law nearly 75 years ago.

Today we can scarcely imagine the wholesale slaughter of bottle-nosed dolphins that occurred along the coast in the 19th century. By 1803, slave watermen near Ocracoke Inlet already operated a dolphin factory. Vast numbers of dolphins fed between Bear Inlet and Cape Hatteras every winter, and the enslaved watermen had extra time because the season's gales slackened ship traffic and lessened demands on stevedoring and piloting.

In small boats, crews of 15 to 18 men surrounded the dolphin pods and snared them in heavy, wide-meshed seines approximately 800 yards long. Once they trapped them in the surf, the boatmen waded into the water and knifed the dolphins that had not already drowned. Then they gaffed the animals and dragged them ashore.

*Continued*





There, they removed their flippers and dorsal fins, stripped and cut the skin and blubber into pieces, and distilled their oil by fire. Each dolphin yielded on average 6 to 8 gallons of oil, which was sold as an illuminant or lubricant.

From that time until 1860, only a few dolphin crews operated between Hatteras and Swansboro during the winter. The dolphin industry did not

through ocean surf. From these boats, they wielded several 18-inch mesh nets 100 to 200 yards long and at least two finer-meshed sweep seines.

When the lookouts signaled that a dolphin pod was approaching, the hunters took to the sea. Circling the pod, the watermen surrounded the dolphins with several mesh nets. "The schools thus entrapped frequently



Scott D. Taylor

A coastal blessing — a pod of dolphins skimming the wave tops along the Tar Heel coast.

really boom until later. By the 1880s, thousands of dolphins were caught annually. When a biologist named Frederick W. True visited the dolphin fishery at Hatteras, he found the beach piled high with "skulls and fragmentary skeletons."

In an 1885 edition of the *Bulletin of the United States Fish Commission*, True describes both the capture and processing of dolphins. First, the dolphin hunters erected signal poles on the ocean beach a few miles on both sides of their camp. Then, they readied from four to six "pilot boats" — sleek, double-ended craft designed to dash

consist of 200 to 300 individuals, the power of which is so great that if they should rush violently against any part of the net it would immediately break," True writes.

Instead of hauling the nets ashore, the watermen used them to confine the dolphins while other men used the sweep-seines to capture 30 or 40 of the mammals at a time. The process sometimes took hours. Yet, True observes, "very few individuals escape, and these mostly by leaping over the nets."

When True visited the Hatteras fishery, the dolphin oil was sold to



merchants in Elizabeth City and Norfolk for 40 cents a gallon. One dolphin's oil earned at most \$3.20, and an entire season's catch would sell for less than \$4,000. That profit was divided by shares, one share per man plus extra shares to the factory owner. By the time the costs of gear, rations and maybe a tad of apple brandy were subtracted, the take-home pay was slim.

Yet during the heyday of the dolphin industry, Outer Banks families had few sources of income. Watermen earned a bit of cash as sailors and pilots, but little money was made commercial fishing until early in the 20th century. Although barter and self-sufficiency were still the rule throughout coastal North Carolina, watermen increasingly wanted cash for a few luxuries — a new oyster dredge like the ones used by the Chesapeake Bay watermen or a bolt of calico or denim that might spare their wives a month of late-night weaving. Hunting dolphins was one of the few ways to afford such labor-saving items.

Oil was the inspiration for dolphin hunting, but it wasn't the only dolphin product. George Sparks, a manager of a Hatteras dolphin factory, reported in 1885 that the hides made "an excellent article of leather." He also indicated, rather optimistically, that he was experimenting with making sausage from dolphin meat. Two of the state's other up-and-coming coastal industries — the menhaden fishery and the guano business — seemed to suggest that dolphin carcasses might even make good fertilizer.

The best surviving portrait of a dolphin fishery comes from John W. Rollinson, an Outer Banks man born in 1827. Rollinson lived at Trent Woods (now Frisco) near Cape Hatteras. Like most bankers, he did a bit of everything to make a living. He was a schoolmaster, port collector, seaman, fisher — and the superintendent at Col. Jonathan Wainright's dolphin factory located halfway between Hatteras and Frisco. For

years, Rollinson kept a journal about local happenings, including deaths, shipwrecks, weather and the number of dolphins slaughtered at Wainright's factory.

During the 1886-87 season, Rollinson's crews caught 1,313 dolphins. They had their hands full when they caught 618 dolphins in November alone, but that changed dramatically by spring. In March, they put their boats into the surf only six times and only twice in May.

One haul could make or break a year. On March 16, 1887, Rollinson's crews captured 136 dolphins in a single day. That was the largest haul in his journal, but editors at *The Weekly Record* in Beaufort reported a bigger catch the year before at the dolphin fishery at Rice Path, a tiny fishing village on the western end of Bogue Banks. The Rice Path watermen reportedly netted 219 dolphins in a single haul.

The hopes for the dolphin fishery rose and fell frequently during the last decades of the 19th century. In the winter of 1887, *The Weekly Record* observed the booming industry with relish. "Over 600 porpoises have been caught this season at Mr. D. Bell's porpoise fishery on Bogue Banks," the newspaper reported that April. The newspaper recorded that three dolphin fisheries operated in Carteret County that year, and a new factory was being built at Harkers Island.

The same year, a dolphin factory at Hatteras reportedly employed 200 hands and caught 2,874 dolphins. Commercial fishing's boosters dreamed that the dolphin industry might become one of the state's leading fisheries, perhaps on par with the mullet fishery that stretched from Ocracoke to Bear Inlet or the shad fishery centered on the lower Neuse River. *The Weekly Record* editors encouraged local fishers "to at once engage in the catching of Porpoise."

However, the markets for dolphin oil fell in the 1890s. And though a dolphin fishery still operated at

Hatteras as late as the 1920s, the visions of a multitude of dolphin factories churning out oil, leather and fertilizer — to say nothing of sausage — never materialized. The peak season seems to have been 1886-87, when four or five factories processed upward of 4,000 dolphins. Overharvesting was probably a factor in the industry's decline. At the Hatteras fishery, the number of dolphins fell in the late 1880s, until Rollinson recorded a catch of only 579 during the 1888-89 season.

It would not be fair to judge the hunters by our modern attitudes toward dolphins. In the last several decades, marine biologists have revealed dolphins to have a lively intelligence that has made them seem spiritual kin to humans. A hundred years ago, dolphins were just another mammal, like deer or cattle. Indeed, many watermen considered dolphins a pest because they ate fish that could be caught and consumed by humans. "I believe that in destroying the porpoise we are doing for all engaged in the fishing industry a great service," Sparks wrote in 1885.

I don't think ill of our dolphin hunters of yesteryear, nor do I rue them the food and clothing that dolphin oil provided for their families. But as I give thanks during this holiday season, I am grateful that conservationists had the foresight to protect marine mammals by law in the 1920s and that we can still see dolphins in our coastal waters. It is one of many small miracles we should never forget. ■

*David Cecelski is a historian at the University of North Carolina-Chapel Hill's Southern Oral History Program and a regular columnist for Coastwatch.*





# State's Oldest Church a Bath Landmark

By Jeannie Faris Norris

## St. Thomas Episcopal Church

**Built:**

*1734 under direction of  
the Rev. John Garzia*

**Location:**

*Craven Street, Bath*

**Architectural  
note of interest:**

*Because the east and south  
walls are longer than their  
west and north counterparts,  
the walls of the church  
are several feet out of square.*

St. Thomas Episcopal Church stood in Bath 42 years before the Declaration of Independence was signed in 1776. Its groundbreaking took place just 16 years after the death of Blackbeard, the ruthless pirate legendary for terrorizing coastal shipping in the area.

This modest 263-year-old church has the distinction of being the oldest of the old. It is the state's oldest church building in North Carolina's oldest town. It witnessed the unfolding of our country's early history and survived the many hurricanes that have blown ashore over the centuries.

At the time St. Thomas Episcopal Church was built, Bath was a hub for 18th-century political leaders — a position it enjoyed from 1696 to 1785. The town lost some of its luster, however, when the county seat and trade activity moved to nearby Washington.

These days, Bath is a quiet, historic village on the Pamlico River, and its landmark church is humble by modern standards. Its small size and simplicity reflect the challenges of building well under pioneer conditions with short supplies of money and materials for construction, according to *A Guide to the Historic Architecture of Eastern North Carolina*.

But take a closer look, and you'll see evidence of a master brick mason at work.

The brickwork is one of the

structure's most interesting features, says the Rev. Gary Fulton, rector of the church. Although no information about the construction survived, archives suggest that the bricks used to build nearby St. Paul's Episcopal Church in Edenton, begun in 1736, were formed and fired in the area. Since the bricks of the two churches are very similar in color and size, it is safe to assume that the bricks used to construct St. Thomas were also fired locally.

"The brick would have been made right there on the site," agrees Al Honeycutt, restoration branch supervisor in the State Historic Preservation Office of the N.C. Department of Cultural Resources. "All they had to dig was the clay ... They would have built a beehive kiln right out of clay bricks and burned them."

The walls of the church were laid up 2 feet thick in Flemish bond, a popular style in the 18th century that alternated bricks lengthwise (stretchers) and widthwise (headers). The mortar was made with lime from crushed oyster shells, and much of it can still be seen on the outside walls of the building.

Bricks used around corners and windows were lightened in a labor-intensive process of manually rubbing the finish off with another brick. Glazed headers and rubbed brick gave pattern and texture to the outside walls. The glazing — a glossy finish



produced in the kilns using certain woods — is largely lost now.

"It's one of the decorative things they did with bricks in that time," Honeycutt says.

Above the door is a projecting molded brick archway that dates back to the original construction. And on either side of the door is a subtle vertical pattern using quarter bricks (called queen closures) in alternating rows.

Recognized today as a major accomplishment for its time and place, the church draws visitors from far and wide. It is one of four exceptional brick buildings from its era that survive in North Carolina, Honeycutt says.

"We have tourists here all the time from all over the world," says Fulton. "We have a register of people who have come from everywhere. In Bath, during any given year, about 10,000 people come through, and many look at the church."

The single-room layout of the church is original, and it seats 95 to 100 people, Fulton says. But a series of restorations beginning in the 1840s imposed later styles on the early 18th-century building. Over time, structures were added and removed, including a bell tower and roofs, ceilings and lighting fixtures, windows and doors, pulpits and pews.

Now, a major renovation is underway to return the interior to its

original colonial style, Fulton says. Church furnishings will be restored using the design, materials and workmanship that might have been available in a frontier town in colonial America. The interior will remain simple.

Among the surviving relics original to the church are two candelabra sent in 1740 by King George II and a silver chalice ferried from England in 1747. The bell, still used today to call worshippers, hangs in a small tower on the southwest side of the church. Although the bell's origin is uncertain, it's known to have been recast and enlarged in New England in 1872.

Less is known about the final resting place of early parishioners. Visitors are often astonished to learn

that no tombstones in the cemetery are older than the 1820s. There are several possible explanations for this. Parishioners may have been buried beneath the church floor, a practice common in England at the time. They could have been interred in a nearby cemetery, or they might have been buried in unmarked graves around the church. A recent survey found 11 unmarked graves — one dating back to the church's earliest days — on the grounds.

Visitors are always welcome to these grounds and to the church building, Fulton says.

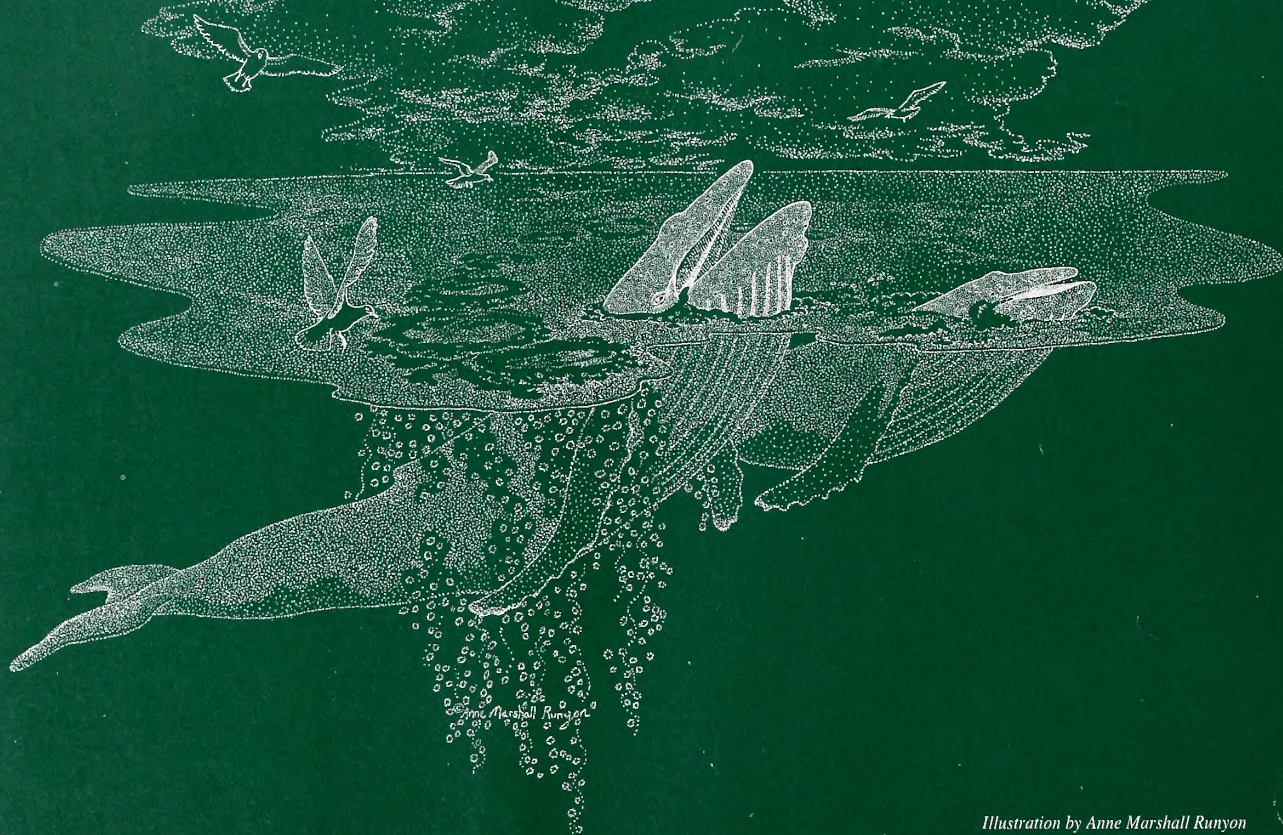
For more information, purchase a copy of *A Short History of St. Thomas Episcopal Church* for \$5. The proceeds will help pay for the church's renovation and maintenance. Call 919/923-9141 or write St. Thomas Episcopal Church at P.O. Box 257, Bath, NC 27808. ☐



Madlin Farrell



# Thar She Blows!



*Illustration by Anne Marshall Runyon*

*By Daun Daemon*

Californians and North Carolinians have more in common than they may think: mountain vistas, fertile cropland, sweeping coastlines — and whales.

People from all over the world travel to California to whale watch, especially during the gray whale's migrations along the Pacific coast.

But the Tar Heel state can also boast leviathans passing offshore as they travel in small groups up and down the Atlantic coast.

Though other species of whales

visit Carolina waters, humpbacks are most visible because they stick close to their migration routes and breeding grounds. Unlike the Pacific coast's gray whales, however, the Atlantic's humpbacks don't loiter and don't come as close to shore.

"Their time in North Carolina is so ephemeral that it would be difficult to set up a whale-watching business," says Andy Wood, curator of education at the North Carolina Aquarium at Fort Fisher.

But folks at the coast do spot whales. Every year, Wood hears reports of a few humpbacks swimming in shallow water close to the beach. Occasionally, the massive mammals linger for a few days in areas rich with fish.

Mostly, they stay on the move.

Whale migrations — in the Atlantic and Pacific oceans — are driven by two forces: feeding and reproduction.

On the North Carolina coast, the best chances of glimpsing a humpback



are late November through December as the whales swim south to their Caribbean wintering grounds.

Humpbacks give birth and mate in the warm waters of the Caribbean during the winter months and then migrate to their northern feeding grounds. After three to four months of frenzied feeding, they swim back to the temperate zone where the cycle begins again. Eleven to 12 months after mating, the females give birth to a single calf.

The newborn calves accompany their mothers on the spring migration north, living on their mother's milk. At about a year old, the young humpbacks are weaned. Thereafter, they follow the cycle of migrations on their own.

Their northern destinations are the waters from Cape Cod up to the Gulf of Maine. According to Wood, the best whale watching on the East Coast can be found during the summer months in the Gulf of Maine.

While there, the great animals gorge on a bounty of food fish including capelin, anchovies, sardines, silver-sides, menhaden and smelt. While the water is warm — in the 60s and 70s — the food is plentiful. Once the water begins to cool, the fish strike out for warmer waters and the whales follow.

"To feed, a humpback swims beneath its intended prey, most often a moving school of small fish. The whale then releases air from its blowhole while swimming in a rising spiral," says Wood. "The air forms a current of bubbles that confuses and concentrates the fish. The whale swims up through

the center of this bubble net and engulfs thousands of fish in one mouthful."

Most of the feeding occurs in the northern waters, but the whales will eat along their migration route. Depending on where the schools of fish are moving in the Gulf Stream, the humpbacks travel anywhere from a few miles to 200 miles offshore.

Though sightings of whales from Tar Heel beaches are rare and precious these days, they once were a frequent occurrence. In fact, the animals were common enough that a shore-based whaling industry thrived in the 17th and 18th centuries.

In *Whaling on the North Carolina Coast*, Marcus B. Simpson Jr. and Sallie W. Simpson explain that "North Carolina's local whaling industry centered around Cape Lookout, where, in their spring migration, northbound right whales passed close by the islands of Bogue and Shackleford Banks."

However, by the late 1800s, overhunting had

depleted the populations. According to the Simpsons, the last whale taken along our coast was a right whale killed at Cape Lookout on March 16, 1916.

The days of peering across the blue Atlantic waters and spotting humpback or northern right whales frolicking close to the shore passed long ago. But Wood is optimistic about the future: "If we continue to protect our great whales and the ocean they live in, they could come back to the North Carolina coast in numbers to rival precolonial times, when you could stand on Shackleford Banks and watch the whales go by." □

## Humpback Bio

- **Length:** up to 50 feet
- **Weight:** 30 to 40 tons
- **Color:** mostly black with white throat and chest
- **Longevity:** can live 90 or more years
- **Distinguishing feature:** large white flipper about a third the body's length
- **Number of humps:** none. The name probably comes from the bulge that shows above the water when the animals curve their backs to dive.

## Splash & Sing

By Daun Daemon

Of all the whales, humpbacks seem the most expressive to us humans because they do two things we also enjoy: splash in the water and sing songs.

While other whales simply breach, humpbacks jump with joy. They hurl themselves vertically out of the water, flippers extended, and then crash back to the surface in a magnificent fountain of sea spray. Though scientists have observed this behavior mostly in the whales' breeding grounds, they still aren't sure why the large mammals do it. Lone humpbacks have been seen breaching, perhaps as an expression of just feeling good.

The thunderous breaches are impressive, but the humpback's singing is eerily beautiful. The only whale that sings, a humpback emits complete sequences of repeated sounds in songs six to 30 minutes long, with no pauses between songs. Even more remarkable than the complexity and endurance of their vocalizations is the humpbacks' ability to change their songs. After eight or so silent months apart, the whales reconvene in their Caribbean breeding grounds and all sing the same altered version of the previous year's song.

Scientists also don't know why humpbacks sing or how — they have larynxes but no vocal cords. Because they sing mostly in their mating grounds, their chirps, cries, yups and other sounds may advertise for mates or warn potential rivals. □



# Wrap Up Good Books for Your Favorite Kids

By Daun Daemon

Kids today yearn for murder mysteries, fantasy tales and chilling horror stories. If these genres tempt children and teens to read rather than watch television or play endless computer games, then they serve a noble purpose. But young folks are also hungry to learn — whether they admit it or not — and the following books with coastal connections can satisfy that appetite.

## • The Editor's Choice

If you loved *Taffy of Torpedo Junction* as a child and now want to leave a copy under the tree for a young person, count your blessings. Just two years ago, this classic by coastal writer Nell Wise Wechter was out of print. But a letter-writing campaign brought about its reissue last year by the University of North Carolina Press in Chapel Hill, and now *Taffy* can once again bring World War II adventure into a kid's life.

Even though I'm 25 years older than the book's audience (10- to 12-year-olds), I enjoyed every word just the same, mostly because the author wrote a fine story populated by good-hearted characters. Wechter probably met most of these characters, in one

form or another, during her life on the Outer Banks and as a school-teacher there during the war.

Set in the early 1940s, the adventure is timeless. Thirteen-year-old Taffy Willis, an orphan who lives with her grandfather, is almost too curious for her own good. Along with her horse Sailor, boxer puppy Brandy and an intrepid friend, she uncovers treachery and subterfuge on Hatteras Island.

The waters off the coast had become known as Torpedo Junction because scores of allied ships were sunk there by German submarines lurking beneath the surface. In *Taffy*, the mystery of how the Germans could be successful with so many allied patrols manning the shoreline is solved. Taffy, Sailor and Brandy are all drawn into the danger, but they survive with their island pluckiness intact.

Taffy's beloved Gramp, who speaks with a marked Outer Banks brogue, knows his granddaughter is a handful — a brave one at that. But he allows her the loose reins to run wild-hearted about the island while he maintains a stern authority. The resulting message Wechter sends to parents and children alike is that kids

who are trusted will thrive, no matter how much incidental mischief they find.

## • An Educator's Picks

As media coordinator for the Cape Hatteras School, Nancy Cowal has developed a keen eye for books that satisfy both her high standards for educational materials and the students' need for entertainment. Below are some of her recommendations for those who want to give children the gift of reading. All are still in print and can be purchased at or ordered through your favorite bookstore.

Theodore Taylor's Outer Banks trilogy — *Stranger From the Sea: Teetoncey, Box of Treasures: Teetoncey and Ben O'Neal* and *Into the Wind: The Odyssey of Ben O'Neal* — will keep children in grades four through six happily reading over their Christmas break. First published more than two decades ago, these adventure novels set in the late 1890s were reissued in 1995 and — like *Taffy of Torpedo Junction* — are delighting a new generation of young readers with stories so exciting kids won't realize they're getting lessons in history at the same time.



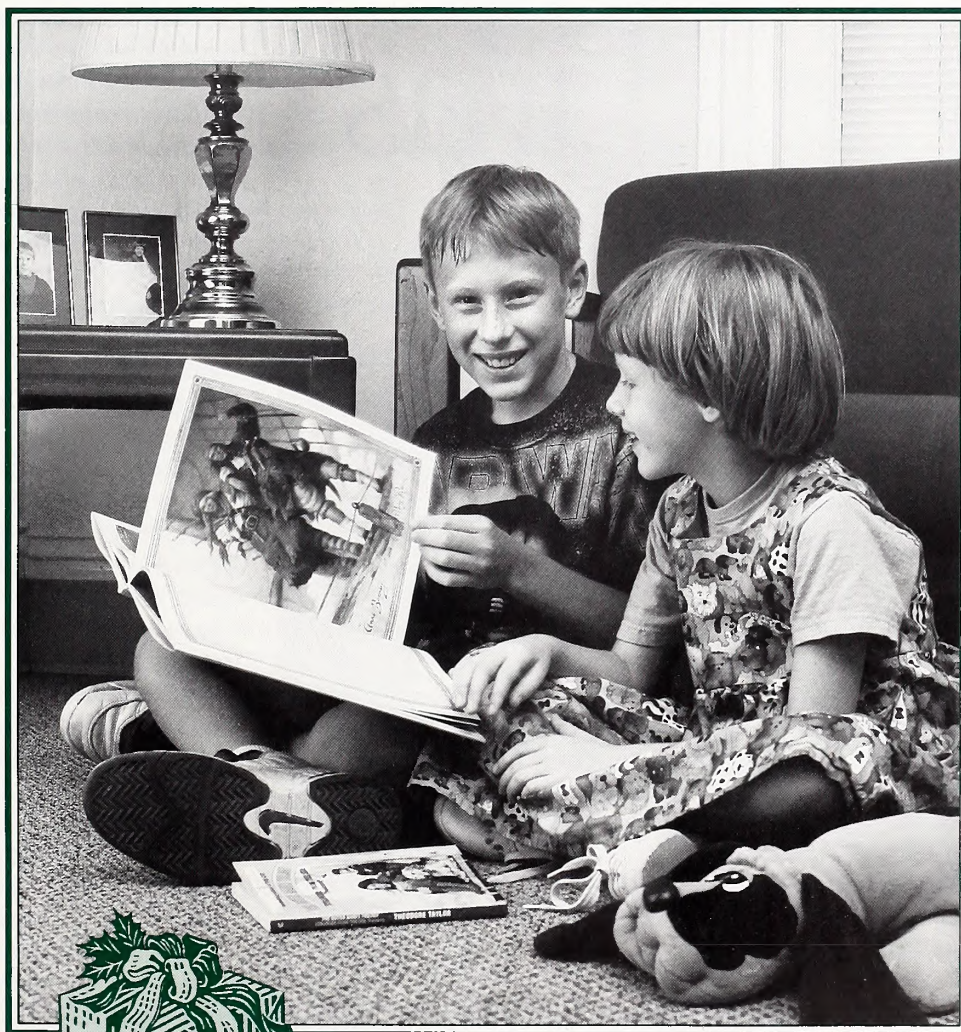
Cowal recommends two of Charles H. Whedbee's many volumes about the coast: *Outer Banks Mysteries and Seaside Stories* (1978) for grades five and up, and *Outer Banks Tales to Remember* (1985) for grades four to eight. Says Cowal, "These traditional folktales are stories people have been telling for generation after generation, and kids are still interested in them." They also help children develop an appreciation for the coast and its heritage.

Part of that heritage is pirate lore, a topic sure to enthrall young minds. Older kids — grades four and up — will enjoy learning about the lives of the pirates who roamed the sea from Rhode Island to Florida in *Blackbeard and Other Pirates of the Atlantic Coast* (1993) by Nancy Roberts. And younger children, from kindergarten to fourth grade, will stay wide-eyed while reading Jane Yolen's *The Ballad of the Pirate Queens* (1995). "She's a fantastic

young people's fiction writer," says Cowal. "And this is a high quality adventure book for kids that is based on historical events." The female protagonists will be a surprise to kids

Cindy Corey's *Exploring the Lighthouses of North Carolina* (1982) introduces children in grades four and up to 10 North Carolina lighthouses.

Little kids and big kids alike will appreciate Cowal's favorite nature guides. Certain to satisfy the curious child in all of us, these classic volumes make gifts of lasting value. Two of the guides are appropriate for children grades four and up: *Birds of the Carolinas* (1980) by E.F. Potter, J.F. Parnell and R.P. Tuelings and *Mammals of the Carolinas, Virginia and Maryland* (1985) by W.D. Webster, J.F. Parnell and W.C. Biggs Jr. Children grades seven and up can identify their favorite



Herman Lankford



who think that only swashbuckling men terrorized the seas.

Of all the coastal sights to see, lighthouses are among the most fascinating to children. For second to fourth graders, Gail Gibbons' *Beacons of Light: Lighthouses* (1990) is a good pick. The beautifully illustrated book explains how lighthouses have evolved through time.

slithery critters with Bernard S. Martof's *Amphibians and Reptiles of the Carolinas and Virginia* (1980). "These guides provide extensive coverage with photos and maps and good descriptions. Though written for adults, little kids are just as interested in them as older kids," Cowal says. "I would have loved to get these for Christmas when I was a child." ■



# Flipping Over Clams

By Daun Daemon • Photographs by Jim Bahen



Clam pick used for digging and raking up clams

Hard clams are easy game for anyone with a bucket, a hand rake and some free time.

But how do you find these tasty bivalves? Look for a keyhole in the mud. This is not a science fiction scenario in which you unlock the hidden door to a watery wonderland — it's a sign the clam gives to anyone willing to bend over and look.

Hard clams (*Mercenaria mercenaria*), also called northern quahogs, are filter-feeding mollusks that breathe and eat through siphons. Using these siphons, clams draw in water and food particles that pass through their gills, which trap algae or phytoplankton. The microscopic single-celled plants then pass to the stomach.

Because clams burrow into bottom sediments, they get the needed nourishment from the water above by extruding their siphons through the sand. The intake and outflow of water creates a current that opens the vent in the mud.

"The hole that the siphon makes looks like an old-timey keyhole," says Jim Bahen, North Carolina Sea Grant marine extension agent.

And Bahen says that the colder months are best for keyhole clamming, the term for locating clams by looking for the telltale opening in the mud.

As the water cools in the fall, it becomes clearer because there are

fewer tiny organisms and less siltation. It is then easier to see the clams signing, or showing the keyholes. Also more visible is clam waste, which resembles small squiggly worms, next to the openings.

According to Bahen, the best times to clam are early morning and late afternoon. When the sun is higher in the sky, it creates a glare that can obscure the keyholes. Looking at low tide is a good idea because more of the bottom is exposed. Even though clams close during low tides, the vents in the sand remain open.

When you spot a keyhole, carefully probe the mud with a tool. Small hand rakes work well, and many fishing stores sell clam rakes with just the right amount of space between the tines to capture only clams big enough for harvest. According to Bahen, small garden claws or even screwdrivers are useful for probing for the clams.



In the winter months, clams burrow deeper into the sediments — about two to three inches down. During warmer weather, they stay closer to the surface.

“You’ll hear a solid *ping* when you bump up against a clam,” Bahen says.

When you hear the ping, flip or dig up your prize.

Clams can be taken any time of year along the North Carolina coast, and mud flats, sand bars and marshes are prime clamming grounds. Make sure you are on public property open to shellfishing and not in a commercial clam garden. These are usually marked, so heed the signs.

Take care not to clam in waters closed because of pollution. When clams filter water, they can take in disease-causing organisms and other contaminants. As a result, some of the state’s waters may be temporarily or permanently closed to shellfish harvest.

If in doubt about your chosen clamming site, check with the N.C. Division of Marine Fisheries about which waters are open to recreational shellfishing. Call the main office in Morehead City at 919/726-7021 or 800/682-2632.

The maximum harvest is 100 clams per day and no more than 200 clams per vessel if you take a boat to your clamming spot. The clams you take home should be at least 1 inch thick. Clams under that limit must be returned to the sediment. Some bait and tackle shops sell inexpensive gauges for measuring clams.

If you turn over small oysters, leave them to settle back into the mud.

To transport your harvest, place the clams in a 5-gallon plastic bucket with 1-inch holes drilled around the bottom 6 inches. The bucket will act as a colander and allow you to wash the clams before you head home. ▣



*Exposed clam*



*Keyhole, surrounded by clam’s waste*

## Keyhole Clamming

To help folks take advantage of North Carolina’s fertile clamming grounds, Sea Grant is preparing a how-to publication that will teach beginners to find and dig their own clams. Using concisely written text and clear illustrations, *Keyhole Clamming*, written by Sea Grant Extension Specialist Wayne Wescott, describes how to find keyholes and the flavorful clams that lie beneath them. The brochure will be available in early 1998. ▣

*For more information about keyhole clamming, contact Wayne Wescott in Manteo at 919/473-3937 or Jim Bahen in Wilmington at 910/256-2083, ext. 212.*



# Safer Seafood

## *HACCP Regulations are Adopted*

By Kathy Hart

After December, Americans concerned about the safety of the nation's seafood can rest a little easier. New federal regulations imposed on the seafood processing industry aim to prevent or significantly reduce health hazards such as bacteria, viruses, parasites and contamination from environmental sources in fish and fishery products.

The U.S. Food and Drug Administration estimates the new regulation will prevent 20,000 to 60,000 seafood-related illnesses a year, which cost consumers as much as \$115 million.

To comply with the new federal regulation, seafood processors across the state are scrambling to understand, develop and adopt new processing procedures and guidelines based on HACCP principles.

HACCP (Hazard Analysis and Critical Control Points) is a preventative food monitoring system designed to ensure food safety. Instead of relying on end-of-the-line food inspections, HACCP users identify critical points in



Scott D. Taylor

the food processing chain where potential food hazards can be controlled, reduced or eliminated.

Former FDA Commissioner David Kessler says HACCP is "the most fundamental shift in the way we think about inspecting food in the past 50 years." In fact, the beef and poultry industries will adopt HACCP procedures over the next few years.

The seafood industry should be ready for the rigors of the new regulation, say two North Carolina State University seafood scientists, thanks to the National Seafood HACCP Alliance — an affiliation of university food scientists and educators, government agencies and trade groups drawn together three years ago by the National Sea Grant College

Program. The alliance was formed to help seafood processors from coast to coast prepare for and comply with the FDA's HACCP regulation.

HACCP's uniqueness has posed implementation problems for the seafood industry,

which ranges from small family businesses to multinational corporations. The HACCP system requires that all processors develop a HACCP plan for each species and processing method used in their plant. Afterward, they must implement monitoring and record-keeping procedures to comply with the plan.

"Given the choice between HACCP and an in-plant inspector, I'd choose HACCP all day long," says Jimmy Johnson of Washington Crab Co. "At least that way I have some control."

To ready his processing facility for the federal regulation that becomes effective Dec. 18, Johnson has hired a new employee to develop and implement his HACCP plan. And he's



installed computer-controlled devices to monitor cooking times and temperatures for his blue crab processing.

"It's costing me a lot of extra money," Johnson says.

But it could be dollars well spent. Seafood buyers, who purchase fish and shellfish for restaurants and supermarkets, are already telling processors that they'll only buy from plants with an approved HACCP plan. It's an extra measure of quality assurance that buyers want to provide their customers, says David Green, director of the NC State University Seafood Laboratory.

"Instead of FDA driving implementation of the HACCP regulation, it is showing early signs of being market-driven," Green says.

To ensure that all processors are as prepared as Johnson, the National Seafood HACCP Alliance implemented a national education and training program for the industry.

At the core of the effort was a training manual developed by a committee led by NC State University food scientist Donn Ward. The manual, written with FDA guidance,

was edited, designed and printed by North Carolina Sea Grant. As of late September, Sea Grant had sold more than 6,000 copies of the guide in the United States and abroad.

"It was absolutely imperative that we develop a manual that readily explained the HACCP concept in understandable language and that had FDA's Office of Seafood involved in its development," Ward says.

Using the manual, a cadre of 440 certified HACCP instructors have trained more than 5,000 processors, regulators, academics and consultants who have attended alliance training courses nationwide. By December, alliance organizers estimate that more than 80 percent of the seafood processing industry will have received HACCP training and certification.

In North Carolina, Green and a team of university and regulatory instructors have trained 240 individuals in five courses co-sponsored by North Carolina Sea Grant. An additional HACCP training course is planned for Dec. 9-11 on the campus of Carteret Community College.

Meanwhile, Green's phone rings

incessantly in his Morehead City office as seafood processors call to ask specific questions about developing a plan, monitoring procedures and recordkeeping for their plants.

"It's been a big undertaking to train the seafood industry in such a short time," Green says. "But I think the alliance, the university and Sea Grant have made every possible effort to help seafood processors prepare for implementation of the HACCP regulation.

"I think we've been very successful in our training, but that doesn't mean we expect industry compliance to be problem-free. We don't," he says. "We (the alliance) will still be called upon to help processors implement their HACCP programs and to provide feedback to FDA about problems."

Johnson says his plant will be ready for the December deadline.

"At least now there will be some recognition and understanding that the seafood industry is working to produce the safest and most wholesome product possible," he says. "If it takes that to make consumers feel good about eating seafood, then fine." □

## HACCP Facts

- Vice President Al Gore awarded the National Seafood HACCP Alliance his National Performance Review Hammer Award on Sept. 22. Gore gives the award to "partnerships that make significant contributions in improving the way federal agencies accomplish their responsibilities."
- More than 5,000 licensed seafood processors in the

United States produce everything from breaded fish sticks to smoked salmon. These products use more than 300 species of fish and shellfish harvested by nearly 260,000 commercial fishers. Last year, these fishers landed 7.5 billion pounds of edible fish and shellfish at U.S. ports.

- The Pillsbury Co. first applied HACCP to food production while supplying meals for the U.S.

space program in the early 1960s. It found that its existing quality-control techniques did not provide adequate protection against contamination and that end-product testing would be so extensive that no food would be left for space flights. Instead, Pillsbury developed a preventative program that kept hazards from occurring during production. □



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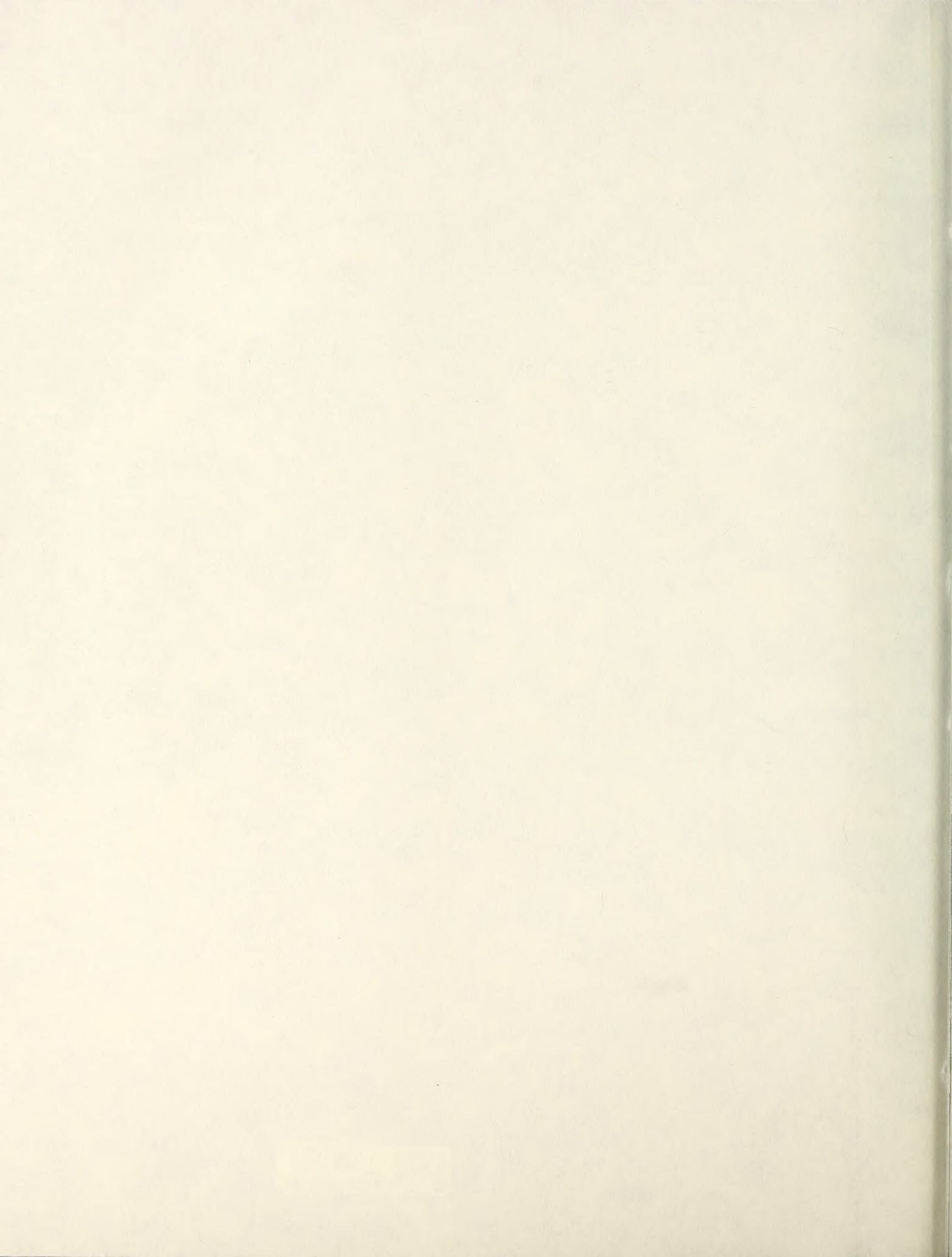
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